

**Human Health and Safety Working Paper
NNIS Project Environmental Assessment
Shawnee National Forest**

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Human Health and Safety

This section describes the human health and safety concerns within the project area, including: (1) Affected Environment, (2) Design Criteria developed to protect human health and safety, and (3) a discussion of the potential effects of each of the proposed alternatives.

Affected Environment – Human Health and Safety

The primary social issue in this analysis is the protection of human health and safety. A variety of potentially hazardous materials, including manufactured synthetic and natural pesticides, have been proposed for use in the project. Trained Forest Service personnel will be applying these chemicals as well as participating in other invasive species management activities that may have an effect on human health and safety. The boundaries for this project were determined through an analysis of the proposed disturbance, chemical, mechanical and manual; protections resulting from treatment protocol and design criteria implemented in order to prevent chemical drifting and entering water systems; the limited mobility of the proposed herbicides; the relatively quick decomposition of the manufactured and natural herbicides; and the inability of the Forest Service to predict and control activities outside of the Forest boundaries (it is understood that nearby and adjacent private lands, both agricultural and household lands, will use many of the same herbicides). The area under consideration is a number of project areas included within the Shawnee National Forest, and all potentially hazardous materials will be used according to safe-handling directions, and all project-related activities will occur within the boundaries of the Shawnee National Forest. However, indirect effects include the use of prescribed fire on 12,000 acres of land in and around the natural areas, therefore it is reasonable to include in this analysis the entire eleven counties in which the SHF is situated. Although the amount of time required for the proposed chemical (if any) to break down is relatively short, the temporal boundary of 10 years was selected because that is the length of the expected life of the effects of the Invasive Species Management project activities as well as the extent of which these effects are measurable and meaningful. Beyond that timeframe any impacts from these activities would have been stabilized and no longer contributing to the direct, indirect or cumulative effects. Five years was chosen to look back at these specific actions because their effects would be not be discernible beyond a five-year timeframe.

Design Criteria – Human Health and Safety

The Forest Service implements a Safety and Health Program that is an integral part of the national and international mission of the organization. The Health and Safety Code Handbook is the primary source of standards for safe and healthful workplace conditions and operational procedures and practices in the Forest Service. Direction in the Handbook applies to all Forest Service employees. The Handbook is consistent with the standards and regulations of the Occupational Safety and Health Administration (OSHA).

The Handbook includes safety practices and procedures for activities included in invasive species management project alternatives, such as manual and mechanical vegetation treatment,

This analysis includes the direct and indirect effects associated with three alternatives, including Alternative 2, the proposed action.

Alternative 1

There will be no additional direct or indirect effects to human health and safety as a result of the implementation of this alternative because no additional invasive species management projects would be implemented. Current levels of mechanical, biological, or chemical control measures would continue including 100-150 acres of non-native invasive species are either pulled or spot torched. Openland management, including mowing, disking and bush-hogging on about 500 acres per year also contributes to a reduction in invasive species. Herbicides are applied in campgrounds and administrative sites (about 50-100 acres per year) which also contributes to invasive species management. Treatment of invasive species with manual (hand pulling herbaceous invasive plants such as garlic mustard and Japanese stiltgrass), or torching would have no effect on human health and safety, however, many infestations of invasive plant species would go untreated. In addition, the SHF burns about 6,000 acres per year that impedes the growth of most invasive species. As a result, there are currently short term direct and indirect effects as a result of the use of prescribed fire to control invasive plant species.

As noted above, Alternative 1 includes the use of prescribed fire in order to control invasive species. The temporary production of smoke from prescribed burning would temporarily reduce visibility and produce some pollutants, especially near the fire, but would not be enough to negatively impact air quality as a whole, although some individuals might experience some short-term irritation, including firefighters (coughing, watery eyes and runny noses). Any raised level of particulate matter from smoke in the air can cause a health problem for individuals with a history of respiratory disease, or are elderly (Core and Peterson 2001; Gill 1999; Sharkey 1997). Past experience has shown these effects are greatly diminished with increasing distance from the burn. The greater the distance from the fire, the more air is available to dilute the harmful, affects of the smoke. Smoke from the initial ignition is expected to last only 4-6 hours, although smouldering may occur over several days. In addition, some characteristics of smoke accumulation are predictable (based on wind speed and direction) and can be managed for.

The IEPA has developed a statewide smoke management plan to address smoke from prescriptive fires (prairie and forest) used to achieve resource benefits. The goals of the smoke management plan are to coordinate with land managers to develop a basic framework of procedures and requirements for managing smoke from prescribed fires; to avoid significant deterioration of air quality and potential NAAQS violations; to mitigate the nuisance and public safety hazards posed by smoke intrusions into populated areas; and to avoid visibility impacts in Federal Class I Areas. Prescribed fires on the Forest are in compliance with this plan and the Forest Plan. These treatments follow a detailed burn plan and strict prescription standards. Prescribed burns also are evaluated using smoke management models (V-Smoke and/or SASEM). Because prescribed fires are planned, and even though there maybe some short term effects and indirect as noted above from smoke production, people living or working in areas adjacent to the project area who might be at risk can be warned and take necessary precautions.

There is at least one species of invasive plants that does pose a risk to human health: tree-of-heaven. It has been reported that exposure to the sap of tree-of-heaven by workers clearing infested areas has caused fever, chills, chest pain, and shortness of breath, as well as an inflammation of the heart muscle. Its pollen is also suggested to have caused rhinitis, conjunctivitis, and asthma (Beck et al. 2008, Bolero et al. 2003). Tree-of-heaven is known to be located in a number of locations across the forest, and probably occurs in many more areas yet

Table HS.1. Human Health Risk Characterizations for Herbicides Proposed for use in Alternative 2 (SERA 2001; 2003a; 2003b; 2004a; 2004b; Tu et al. 2001).

<p><i>Clopyralid</i> Eye Risk Inhalation Risk Dermal Risk Cancer Risk Reproductive Effects</p>	<p>Can cause persistent damage to eyes if direct contact occurs.</p> <p>Harmful if inhaled. Does not readily volatilize.</p> <p>Transient dermal redness; does not cause skin sensitization.</p> <p>No evidence of cancer with use of clopyralid. However, the technical grade contains hexachlorobenzene as a contaminant; it is classified as a potential human carcinogen by US EPA. No basis for asserting that its presence in technical grade clopyralid will substantially impact cancer risk under conditions characteristic of applications made in Forest Service programs.</p> <p>Does not produce developmental effects at doses that do not produce maternal toxicity.</p>
<p><i>Glyphosate</i> Eye Risk Inhalation Risk Dermal Risk Cancer Risk Reproductive Effects</p>	<p>Non-irritating to slightly irritating if direct contact occurs; no permanent damage reported.</p> <p>Inhalation is not an important route of exposure because of its low volatility.</p> <p>Poorly absorbed through skin.</p> <p>Classified as Group E pesticide by US EPA: "Evidence of non-carcinogenicity for humans".</p> <p>Adverse Reproductive effects have not been noted.</p>
<p><i>Sethoxydm</i> Eye Risk Inhalation Risk Dermal Risk Cancer Risk Reproductive Effects</p>	<p>Irritating upon direct contact.</p> <p>Some irritation at high exposure levels. Does not readily volatilize.</p> <p>Irritating to the skin.</p> <p>Based on studies, no evidence of cancer risk.</p> <p>Based on studies, no evidence of reproductive risks.</p>
<p><i>Triclopyr</i> Eye Risk Inhalation Risk</p>	<p>May cause irritations to eyes.</p> <p>Inhalation exposures to not be of toxicologic concern. Ester formulations can be volatile, and care should be taken during application. Salt formulation is much less volatile than the ester formulation.</p>

exposures - most of which involve highly conservative assumptions - are at or below the reference dose. The use of the reference dose - which is designed to be protective of chronic or lifetime exposures - is itself a very conservative component of this risk characterization because the duration of any plausible and substantial exposures is far less than lifetime (SERA 2003a; 2003b; 2004a; and 2004b). None of the application areas will exceed the threshold of amount of herbicide allowed per label instruction. Therefore there will be no significant direct, indirect or cumulative effects to human health and safety.

Alternative 2 also includes the use of prescribed fire in order to control invasive species. Similar to alternative 1, short term potential effects as a result of the use of prescribed fire would include the temporary production of smoke which would temporarily reduce visibility and produce some pollutants, especially near the fire, but would not be enough to negatively impact air quality as a whole, although some individuals might experience some short-term irritation, including firefighters (coughing, watery eyes and runny noses). Any raised level of particulate matter from smoke in the air can cause a health problem for someone, especially if they have a history of respiratory disease or are elderly (Core and Peterson 2001; Gill 1999; Sharkey 1997). Past experience has shown these effects are greatly diminished with increasing distance from the burn. The greater the distance from the fire, the more air is available to dilute the harmful, affects of the smoke. Smoke from the initial ignition is expected to last only 4-6 hours, although smouldering may occur over several days. In addition, some characteristics of smoke accumulation are predictable (based on wind speed and direction) and can be managed for.

The IEPA has developed a statewide smoke management plan to address smoke from prescriptive fires (prairie and forest) used to achieve resource benefits (see discussion of a statewide smoke management plan included in Alternative 1 designed to mitigate potential harmful effects o the inhalation of smoke.

Alternative 3

There will be no direct, indirect or cumulative affects to heritage resources as a result of the selection of Alternative 3. The methods to control invasive plant species proposed in Alternative 3 consist of aggressive manual and mechanical treatments (prescribed fire, clipping, cutting, torching, weed whipping, hand and mechanical pulling, grubbing, tilling, tarping, and bull dozing and/or back hoeing. Natural weed killers would be applied when manual and mechanical methods are ineffective. This alternative is designed to control invasive plant species, but not eradicate them.

The effects to human health and safety would be similar to those described for mechanical controls under Alternative 2. The difference would be related to the fact that more mechanical control is planned in Alternative 2. Mechanical control of certain plants (e.g., multiflora rose, tree-of-heaven) could increase the risk of worker injury. For example, workers would more likely be scratched and cut by multiflora rose if they were grubbing out plants than if they were applying herbicides. Similarly, workers could be more likely to coming in contact with tree-of-heaven sap if they are required to chainsaw and grub out stumps, rather than applying a basal bark application of herbicide. Design Criteria for Alternative 3 will protect FS employees, trained volunteers, and the public from natural herbicide applications, as well as hand and mechanical treatments.

Natural weed killers such as acetic acid (vinegar) can be effective in killing weeds but even those have limitations. It does kill annual plants, but does not kill the perennial plant root systems. It does appear to be safe for human health and safety, and even though vinegar is an acid, it breaks down quickly in the soil and is not likely to accumulate enough to affect soil pH for more than a

Like Alternatives 1 and 2, this alternative also includes the use of prescribed fire in order to control invasive species. Similar to alternative 1, short term potential effects as a result of the use of prescribed fire would include the temporary production of smoke which would temporarily reduce visibility and produce some pollutants, especially near the fire, but would not be enough to negatively impact air quality as a whole, although some individuals might experience some short-term irritation, including firefighters (coughing, watery eyes and runny noses). Any raised level of particulate matter from smoke in the air can cause a health problem for someone, especially if they have a history of respiratory disease or are elderly (Core and Peterson 2001; Gill 1999; Sharkey 1997). Past experience has shown these effects are greatly diminished with increasing distance from the burn. The greater the distance from the fire, the more air is available to dilute the harmful, affects of the smoke. Smoke from the initial ignition is expected to last only 4-6 hours, although smouldering may occur over several days. In addition, some characteristics of smoke accumulation are predictable (based on wind speed and direction) and can be managed for.

However, the IEPA has developed a statewide smoke management plan to address smoke from prescriptive fires (prairie and forest) used to achieve resource benefits (see discussion of a statewide smoke management plan included in Alternative 1 designed to mitigate potential harmful effects o the inhalation of smoke.

Cumulative Effects

The area under consideration is a number of project areas included within the Shawnee National Forest, and all potentially hazardous materials will be used according to safe-handling directions, and all project-related activities will occur within the boundaries of the Shawnee National Forest. Potential effects include the use of prescribed fire on 12,000 acres of land in and around the natural areas, therefore it is reasonable to include in this analysis the entire eleven counties in which the SHF is situated. Although the amount of time required for the proposed chemical (if any) to break down is relatively short, the temporal boundary of 10 years was selected because that is the length of the expected life of the effects of the Invasive Species Management project activities as well as the extent of which these effects are measurable and meaningful. Beyond that timeframe any impacts from these activities would have been stabilized and no longer contributing to the cumulative effects. Five years was chosen to look back at these specific actions because their effects would be not be discernible beyond a five-year timeframe.

Past, Present and Reasonably Foreseeable Actions that will have little effect on the human health and safety of the public included within the analysis area. Past activities that have occurred within the analysis area include farming and grazing; residential development; timber harvest; recreation (trail construction and maintenance, picnicking, fishing, hunting, hiking and rock climbing); wildlife management; unauthorized use of ATV's and OHV's; special use permits (utilities, communications military training, recreational events, vendors, and roads); road construction, maintenance and use; and tree planting, timber stand improvements, herbicide use to control invasive plants at administrative sites, as well as on private property.

Present actions within the project area include, but are not limited to, trail construction, maintenance and use; power-line maintenance; ATV use (authorized and unauthorized, see below); timber harvest (predominantly on private lands); agricultural management (row-cropping and pasture) on private lands; residential development; fire (wild and prescribed) and fire suppression; use of non-system trails; road maintenance and use; tree-planting; equestrian

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		<ul style="list-style-type: none"> • Herbicides stored on-site would have Material Safety Data Sheets per Forest Service guidelines. • Washing and rinsing of equipment used in the mixing and application of pesticides will occur in areas where runoff will not reach surface waters, wetlands, fens, sinkholes, or other special habitats • Rinse water for cleaning or rinsing actions in conjunction with herbicide treatment would be disposed of according to Environmental Protection Agency regulations. • Herbicide containers would be disposed of following label specifications, state and federal laws, and Forest Service guidelines • All requirements in a Safety and Spill Plan (Appendix ?) would be followed
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Table X. Mitigation Measures, Human Health & Safety, Non-Native Invasive Species Project.		
Resource Area	Design Criteria	Rationale / Effectiveness
Human Health And Safety	The Design Criteria for the protection and preservation of the health and safety of FS employees, volunteers, and the general public will be implemented and rigorously adhered to.	Mitigation measures include review of JHAs, MSDS, and natural and synthetic product labeling, to ensure safe handling, application and clean-up and storage of potentially hazardous material. Human and Ecological Risk Assessments have been prepared for the USDA Forest Service for all the synthetic herbicides planned for use. These documents are available at www.fs.fed.us/foresthealth/pesticide/risk/shtml .
	After completion, this project will be included in the Forest monitoring plan in order to assess the degree of effectiveness of the selected management activities.	The implementation of alternatives 1 to 3 will have no effect on human health and safety. Monitoring this project will determine the effectiveness of the agreed upon invasive species management design criteria.

Table X. Monitoring, Human Health & Safety, Non-Native Invasive Species Project.		
Resource Area	Design Criteria	Rationale / Effectiveness
Human Health And Safety	Ensure the Human Health and Safety Design Criteria were implanted as determined in the Environmental Assessment. Visual inspection of project activity daily during project implementation. Weekly water testing for inclusion of selected natural or synthetic herbicides	Evidence of reduction of Invasive species as well as the continued health of the project area, including water, and the human health and safety of FS employees, volunteers and the general public.