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Fuels Planning: Science Synthesis and Integration

Environmental Consequences Fact Sheet: 15

The Wildlife Habitat Response Model

Rocky Mountain Research Station

Pacific Northwest Research Station

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Synthesizing Scientific Information for Fire and Fuels Project Managers

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Fuels planning: Science synthesis and integration, an interagency research/management partnership to support the Ten-Year Fire Plan, led by Russell T. Graham, RMRS, and Sarah M. McCaffrey, NCRS.

What Is the Wildlife Habitat Response Model?

The Wildlife Habitat Response Model (WHRM) is a Web-based computer tool for evaluating the potential effects of fuel- reduction projects on terrestrial wildlife habitats. The WHRM uses species-habitat associations in ponderosa pine (*Pinus ponderosa*), dry-type Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and mixed conifer forests to qualitatively predict how changes in critical habitat elements may affect wildlife habitat suitability of treated stands. Organizing potential responses of fauna into a conceptual framework based on knowledge of habitat requirements can help predict outcomes of fuels treatments, even when first-hand information about treatment effects does not exist.

Intended Users

The WHRM was created to assist forest planners and specialists in evaluating alternative fuels treatments on terrestrial wildlife habitats in dry interior forests of the Western United States.

Mule deer on a burn pile.

Intended Uses

The WHRM was designed as a planning tool to evaluate how alternative fuel treatments may affect the breeding, foraging, and shelter habitats of a single species. At the present time, the model is relevant only for dry interior forests of the Western United States, and has no specific temporal scale.

What Inputs Are Required?

Users input the percent change in key habitat elements based on fuel treatment objectives or desired future conditions, or predicted from computer simulations such as the Forest Vegetation Simulator with the Fire and Fuels Extension (FFE/FVS). A keyword file is available for FVS users that will automatically generate these reports. The WHRM uses relative change values (percent change from pretreatment to posttreatment). Some habitat elements are subdivided into size classes. These elements include:

- Bare mineral soil
- Duff
- Litter
- Grasses
- Forbs
- Shrubs
- Down wood
- Snags
- Crown base height
- Tree canopy cover
- Live trees

What the Model Does

Using data gleaned from scientific literature and expert opinion, the WHRM first identifies habitat elements that are important for a species' reproduction, food acquisition, and shelter from predators and environmental extremes. Users then decide how each habitat element is likely to change given a proposed fuel treatment. Changes in habitat elements are relative and categorically expressed as percent change from pre- to posttreatment levels. Based on user inputs of relative change in habitat elements, the model then displays the expected suit-ability of the posttreatment environment for reproduction, food, and shelter. Users can then enter variations of proposed fuel management activities by altering habitat element changes in the model to identify how alternatives may influence the habitat suitability for a species. Background information and citations for each species can be displayed. All output and tables can be copied and pasted into analysis documentation.

What the Model Does Not Do

The WHRM does not make quantitative predictions, nor does it predict population-level responses of wildlife species. The WHRM does not include inter- and intra-specific interactions such as competition among species, nor environmental or demographic random events. The WHRM does not have a temporal scale, but users can predict changes over time by altering the habitat elements appropriately. This can be effectively accom-plished by referring to FFE/FVS habitat element predictions at 1, 5, and 10 years.

How to Obtain the Model

The Wildlife Habitat Response Model and other related tools can be found at the following Web site:

http://forest.moscowfsl.wsu.edu/fuels

Taxonomic group:	Ungulates
Species:	Mule deer (Odocoileus hemionus)

Life History Requirements		Key Habitat Element(s)	Change in Habitat Element(s) (user's selection)	Predicted Effects on Habitat Suitability	Average Effect on Habitat Suitability
Reproduction	Nest Sites, Birthing Areas, Breeding Sites	Forb/Herbaceous Cover	41-70% Increase	Moderately Positive	Slightly Negative, but low confidence *
		Shrub Cover 0-18" height	11-40% Decrease	Slightly Negative	
		Trees (all species) 0-4.9" dbh	Greater than 70% Decrease	Highly Negative	
Food Resources	Foraging Habitat	Tree Canopy Cover	41-70% Decrease	Moderately Negative	Moderately Negative
	Forage, Pray Habitat	Grass Cover	41-70% Increase	Moderately Positive	Slightly Positive, but low confidence *
		Forb/Herbaceous Cover	41-70% Increase	Moderately Positive	
		Shrub Cover (size classes not specified)	11-40% Decrease	Slightly Negative	
Cover	Shelter from Predators, and Environmental Extremes	Shrub Cover (size classes not specified)	11-40% Decrease	Slightly Negative	Slightly Negative
		Tree Canopy Cover	41-70% Decrease	Moderately Negative	
		Shrub Cover 18+" height	Greater than 70% Decrease	Highly Negative	

Screen capture of final model output showing projected changes in habitat elements for mule deer based on a specified treatment.

Environmental Consequences Fact Sheets

Look for fact sheet topics from the Environmental Consequences Team including information about the effects of fire behavior and alternative treatment strategies, Wildlife Response Model, weed responses, riparian systems, soil erosion, restoration objectives, treated spaces, the Fire Effects Information System (FEIS), and the First Order Fire Effects Model (FOFEM).

Fuels Planning: Synthesis and Integration

This fact sheet is one in a series being produced as part of a larger project supported by the USDA Forest Service to synthesize new knowledge and information relevant to fire and fuels management. Fact sheets address topics related to stand structure, environmental impacts, economics, and human responses to these factors. Information in the fact sheets is targeted for the dry forests of the Inland West, but is often applicable across broad regions of the country. For more information, please visit our Web site at: www.fs.fed.us/fire/tech_transfer/synthesis/synthesis_index

The Fuels Planning fact sheets are based on preliminary findings. Information from fact sheets will be synthesized in an upcoming publication.