

Weed Spread Modeling– Building a New GIS-based Model Based on Known Growth Requirements

i STRENGTHS

Strengths of building a new model over adapting an existing model include:

- A model tailored to information you have available
- An inherent understanding of model assumptions and functionality

i LIMITATIONS

Limitations of building a new model over adapting an existing model include:

- More upfront work to research and develop the model
- The model is only as good as your understanding of factors contributing to susceptibility



IMPORTANT

To build a weed spread model, you must have:

- An existing susceptibility map
- A map of existing weed locations.

AUTHOR

John Gillham
Remote Sensing
Applications Center,
Salt Lake City, UT

Summary

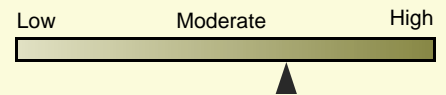
Many predictive weed spread models associate habitat suitability for a specific weed species with known (existing) infestations of the weed. The rate of spread of the weed is predicted based on a set maximum under ideal environmental circumstances. This type of model is based on the principle that weeds will spread faster when growing in areas that are well suited for that species. In a well-suited environment, a maximum possible rate of spread per year is assumed. In less favorable environments, a weed must expend more energy adapting to the environment so the infestation expands at a slower rate.

QUICK LOOK

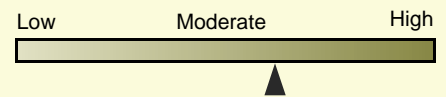
Objective:

This document outlines how to develop a basic weed spread model for your specific weed and area.

Cost:



Expertise:



Major Steps

1. Obtain a habitat susceptibility map and rank the susceptibility.
2. Run the model.
3. Evaluate the predicted spread and explore management options.

Basics of a Weed Spread Model

The most basic weed spread model requires a susceptibility layer and an existing (surveyed/mapped) infestations layer. By ranking the environmental susceptibility of areas surrounding each infestation, a model can be developed to estimate the weed's annual rate of spread according to the susceptibility index. Prediction maps can be joined together to create time-series animations for enhanced visualization (see *A Weed Manager's Guide to Remote Sensing and GIS* to view an example).

If you do not have a susceptibility layer, refer to the documents in *A Weed Manager's Guide to Remote Sensing and GIS* on adapting or building a susceptibility model.





CAUTION

Remember, a weed spread map is only a theoretical prediction. Evaluate it carefully before making management decisions.



TIP—HISTORIC DATA

If available, historic weed location data can help refine your model by allowing you to make “predictions” from the historic data that can be compared to the current situation.



ASSISTANCE?

For more information or assistance, please contact

USDA Forest Service
Remote Sensing
Applications Center
(RSAC)

2222 S. 2300 W.
Salt Lake City, UT 84119
(801) 975-3750

RSAC Intranet:
<http://fsweb.rsac.fs.fed.us>
RSAC Internet:
<http://www.fs.fed.us/eng/rsac>

Run the Model

After determining the most realistic spread rate of each infested cell in a given year, the model can be run numerous times to predict where infestations are likely to spread. Predictions are generated iteratively and in a compounding fashion to display the spread of weed species at designated time intervals specified by the user (e.g., 5, 10, or 20 years) (figure 1).

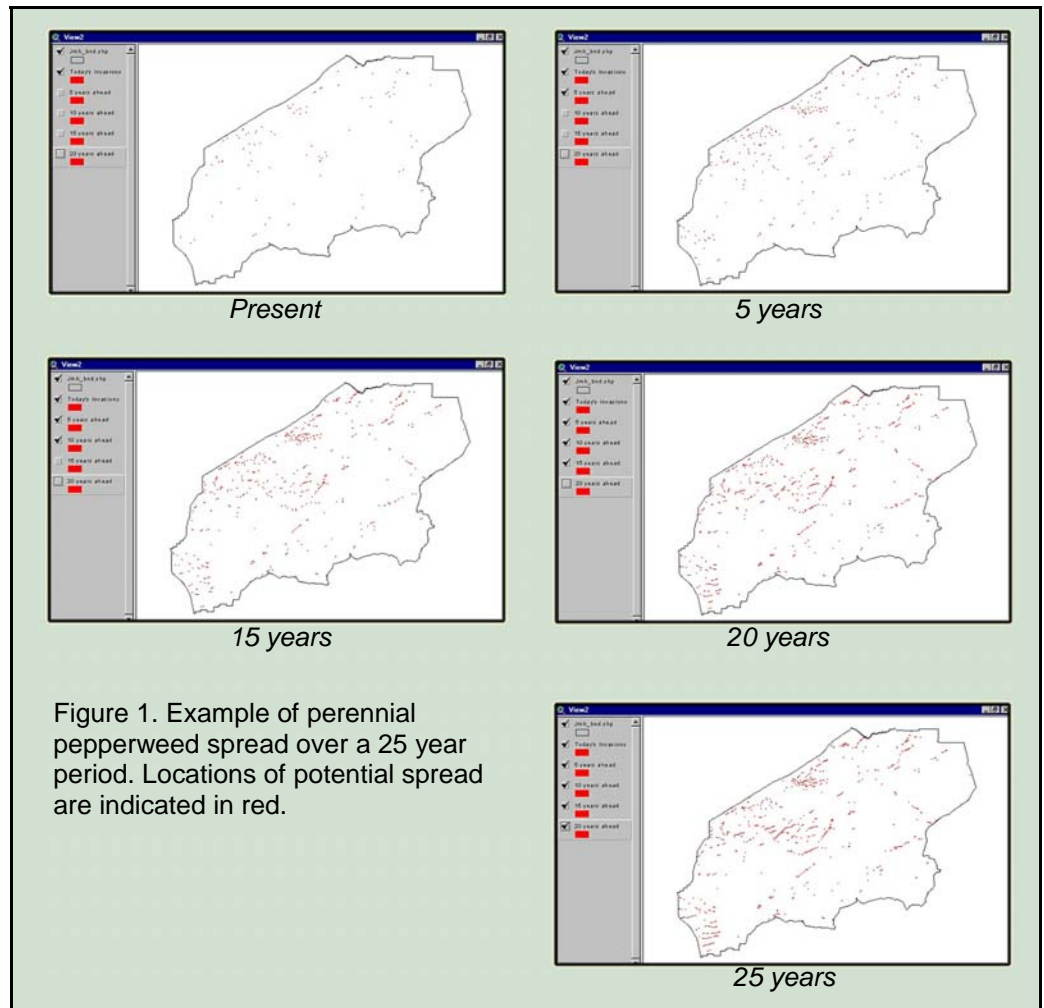


Figure 1. Example of perennial pepperweed spread over a 25 year period. Locations of potential spread are indicated in red.

Evaluate the Prediction and Explore Management Options

A weed spread model provides a rough estimate of weed expansion. It allows managers to gain an improved biological and environmental understanding of potential weed infestations in the future, if control actions are not taken.

