

# Noxious Weed Survey and Mapping System

Diana Cooksey and Roger Sheley

The primary objective of weed surveying and mapping is to identify and delineate land with populations of unwanted plants. These surveys are conducted to predict areas potentially subject to weed invasion; understand the invasion process and determine how weeds spread; develop, implement, and evaluate weed management plans; assess the economic impact of weed invasion; and increase public awareness, education, and weed management efforts.

Survey information is collected and compiled into maps showing the distribution and severity of infestations. Monitoring involves repetitive surveys to track weed populations over time. A standardized system is necessary to provide reliable information that can be compared from year to year.

In Montana, representatives from federal, state, and county agencies—as well as industry and private individu-

als—developed guidelines and standards for a statewide noxious weed survey and mapping system. This document introduces *Montana Noxious Weed Survey and Mapping System*.

The specific objectives of the *Montana Noxious Weed Survey and Mapping System* are:

- to determine and record locations of noxious weeds in Montana,
- to accurately calculate the total number of acres infested for each weed on the state noxious weed list,
- to determine how fast noxious weeds are spreading by comparing weed inventories from year to year.

This effort represents the beginning of a noxious weed inventory for the state of Montana. As more weed managers participate in the program, a greater portion of the state will be accurately mapped, a process that will take several years.

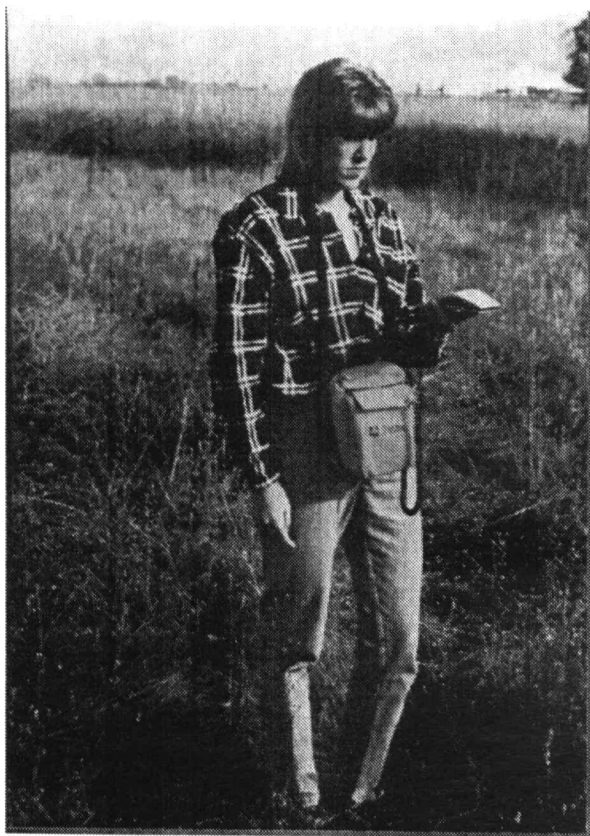
## Type and scale of base maps

Weed survey maps may be created by hand-drawing infestation boundaries on base maps, using a computerized mapping system such as ArcView or CountyCAD, or by collecting location coordinates of weed infestations using Global Positioning System (GPS) technology. For those who are hand-drawing weed infestations on base maps, USGS 1:24,000 scale (7.5 minute series) maps should be used. This scale is appropriate for weed management planning and can easily be consolidated into 1:100,000 scale county and statewide maps.

In counties where detailed soil surveys have been completed, aerial photographs may be available (contact the Natural Resources Conservation Service for information). Aerial photographs show good detail and can be used to locate your position and draw in surveyed weed infestations. It is important that they are geodetically corrected<sup>1</sup>, otherwise they cannot be digitized. If the aerial photographs are not geodetically corrected, the weed delineation could be drawn on them and then later transferred to a topographic map which can be digitized.

## Color pencils

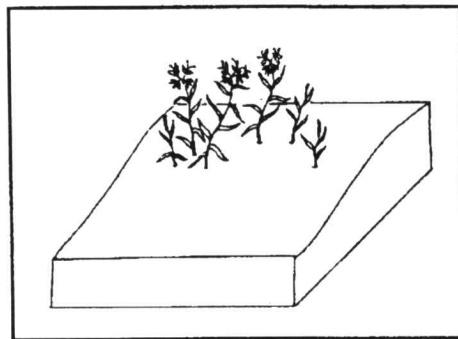
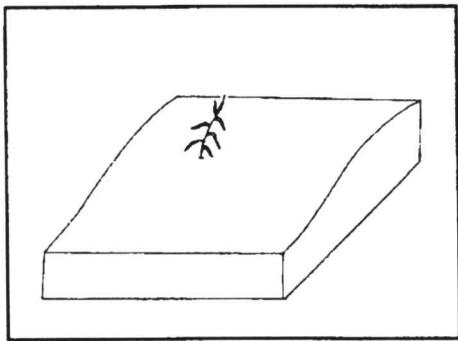
A problem with hand-drawn maps is that the accuracy of mapping can be affected by the size of the drawing instrument. A line 1/32 of an inch wide (1 mm) on a 1:24,000



Collecting data using GPS.

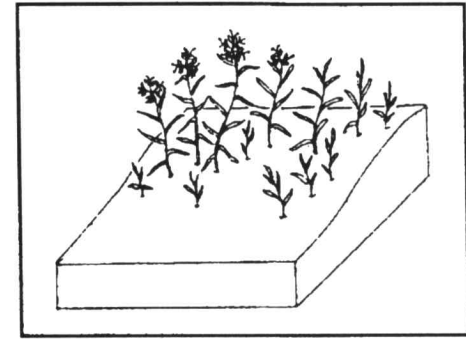
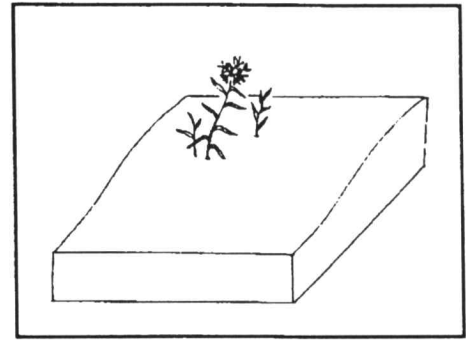
<sup>1</sup>There are changes in scale across an aerial photograph due to the particular configuration of platform altitude, camera system alignment and topography. The image must be rectified so it matches with a "correct" map of the earth. This process is called rubber-sheeting and results in a geodetically correct image that can be reliably used in a Geographic Information System (GIS).

Trace



Moderate

Low



High

Examples of cover classes.

scale USGS map is equal to 62.5 feet on the ground. If a felt pen is used to mark the perimeter of a weed infestation, it may appear larger than if a No. 2 pencil is used. Therefore, a standardized size of drawing instrument should be used to delineate weed infestations. For the *Montana Noxious Weed Survey and Mapping System*, Berol® VERITHIN® color pencils were chosen. If the pencils are kept sharp, the line width is about 1/64 of an inch (0.5 mm). This line width represents about 30 feet on a 1:24,000 scale map. The pencils come in sets of 24 colors (15 are used to designate Montana's category 1, 2, and 3 noxious weeds), have strong, long-lasting lead and are light-fast and waterproof. They work well with both paper maps and mat acetate or Mylar overlays. The overlay should be smaller than the topographic map so it can be taped to the map. A convenient size to use with 7.5 minute topographic maps is 18" x 24". Mylar overlays should be sprayed with a map fixative so pencil markings don't smear. Topographic maps usually have four "+" marks that can be used for lining up the overlay on the map. These should be marked carefully on the overlay.

### Symbols

Before mapping weed infestations, *outline* the survey area on the map and write the *date* of the survey in the upper right corner of the outlined area. Areas inside the survey boundary without size and location designations will be considered weed free. Map the infested areas using the

following symbols to designate the size and locations of the infestations (symbols should be centered over the infestation sites).

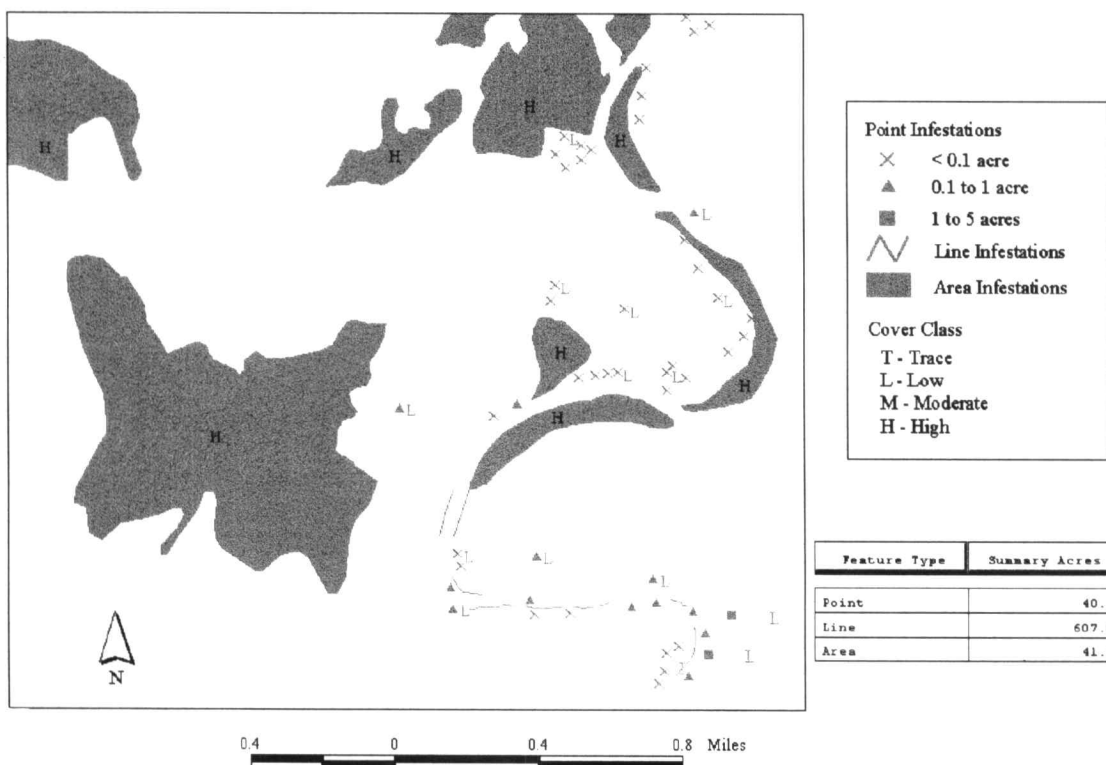
### Infestation size

- x = less than 0.1 of an acre
- Δ = 0.1 to 1 acre
- = 1 to 5 acres
- ☁ = areas larger than 5 acres should be outlined directly on the map
- ~ = infestations that follow linear features such as roads and streams should be designated by drawing lines on the map

In addition to drawing the line on the map, record the following information:

1. Width of line. Record the width of the weed infestation in meters or yards next to the line drawn on the base map.
2. Direction of weeds from line. Next to the line, write an L, R, or C depending on where the weeds are located (i.e. are the weed infestations to the left, right, or on the line you have drawn on the base map?)

Noxious weeds should be designated by their Weed Science Society of America-approved computer codes from the *Composite List of Weeds*, Revised 1989, available from WSSA, 1508 West University Ave., Champaign, Ill. 61821-3133 (and shown for some common Montana weeds in Table 1). Each plant on Montana's state noxious



Computer-generated map of weed infestations along the Smith River near Great Falls, Mont. in the summer of 1996.

weed list should also be color coded according to Table 1. Standardized color coded designations by weed species facilitate map interpretation.

#### Percent cover by species

Mapping systems for weed management planning must be simple and the data must be easy to collect. Weed cover has been determined to be the most important stan-

Table 1. Five-letter codes and color designations for the 16 Montana noxious weeds.

Noxious weed species Common Name	Noxious weed species Scientific name	WSSA 5-letter code	Designated color (Berol® VERITHIN®/ white box) <sup>1</sup>	Designated color (Prismacolor Berol® VERITHIN®/black box)
<b>Category 1</b>				
leafy spurge	<i>Euphorbia esula</i>	EPHES	Green (739)	Peacock Green (739)
Canada thistle	<i>Cirsium arvense</i>	CIRAR	Tuscan Red (746 1/2)	Tuscan Red (746 1/2)
Russian knapweed	<i>Centaurea repens</i>	CENRE	Carmine Red (745)	Terra Cotta (745 1/2)
spotted knapweed	<i>Centaurea maculosa</i>	CENMA	Lavender (742 1/2)	Parma Violet (742 1/2)
diffuse knapweed	<i>Centaurea diffusa</i>	CENDI	Light Grey (734 1/2)	Warm Grey (734 1/2)
field bindweed	<i>Convolvulus arvensis</i>	CONAR	Pink (743)	Deco Pink (743)
whitetop (hoary cress)	<i>Cardaria draba</i>	CADDR	Sky Blue (740 1/2)	Peacock Blue (740 1/2)
Dalmatian toadflax	<i>Linaria dalmatica</i>	LINDA	Canary Yellow (735)	Canary Yellow (735)
St. Johnswort (goatweed)	<i>Hypericum perforatum</i>	HYPPE	Olive Green (739 1/2)	Olive Green (739 1/2)
sulfur cinquefoil	<i>Potentilla recta</i>	PTLRC	Orange (737)	Orange (737)
<b>Category 2</b>				
dyer's woad	<i>Isatis tinctoria</i>	ISATI	Grass Green (738)	Grass Green (738)
purple loosestrife	<i>Lythrum salicaria</i>	LYTSA	Purple (752)	Dahlia Purple (752)
purple loosestrife	<i>Lythrum virgatum</i>	LYTVI	Black (747)	Black (747)
<b>Category 3</b>				
yellow starthistle	<i>Centaurea solstitialis</i>	CENSO	Ultramarine (740)	Ultramarine (740)
common crupina	<i>Crupina vulgaris</i>	CJNVU	Violet (742)	Violet (742)
rush skeletonweed	<i>Chondrilla juncea</i>	CHOJU	Scarlet Red (744)	Scarlet Red (744)

<sup>1</sup>Because of a change in ownership there are 2 versions of the Berol® VERITHIN® pencil packs. The original set comes in a white box. The new set comes in a black box. There are slight differences in the color names and numbers. Please use the colors listed in the column that refers to your box. Please choose different colors for mapping other county-designated noxious weeds not listed here.

Standard data to be collected for the statewide system. Cover may be estimated as a percent of the ground covered by a particular weed species. Estimates are categorized by cover class. Cover class should be indicated directly on the map next to the infested acres symbol. Use the following symbols to indicate infestation cover class.

#### Cover class

- T = (Trace; rare): less than 1% cover.
- L = (Low; occasional plants): between 1 and 5% cover.
- M = (Moderate; scattered plants): between 5 and 25% cover.
- H = (High; fairly dense): between 25 and 100% cover.

Additional information (such as weed density or growth stage) is optional and can be noted on either base maps or clear overlays.

#### Density (optional)

Note number of plants per square yard or square meter.

#### Growth stage (optional)

- S = Seedling
- B = Bolt
- Bd = Bud
- Fl = Flower
- SS = Seed Set
- M = Mature

#### Using weed survey data

Weed data and maps can be used to develop a county weed management plan based on land-use objectives. Critical management and environmental information such as weed species present, extent and severity of weed infestations, and environmental conditions (e.g. sensitive areas) can be determined from maps. Maps can also be used to direct the implementation of the weed management plan. They show the location of areas needing attention and can be used to set priorities, estimate needs for equipment, supplies and labor, and to guide action crews. Once the plan is implemented, maps can be used to evaluate weed management strategies by comparing initial maps with subsequent maps to find out how weed infestations have changed over time. This information should be used to identify portions of the plan which do not meet management objectives and to adjust management strategies.

Maps can also be used to predict those areas potentially subject to weed invasion and guide surveys of land adjacent to infested areas. They can be used as communication tools for public awareness and education, and for calculating the economic and ecological impacts of noxious weed invasion.

Authors are land resources project coordinator and extension noxious weed specialist, respectively, Department of Plant, Soil and Environmental Sciences, Montana State University-Bozeman. Published with approval of the directors, Montana Agricultural Experiment Station as Journal No. J-5106.

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### NMSU Cooperative Extension Service, Extension Riparian Management Specialist Position

Entry-level, assistant professor, tenure-track position assigned to the Range Improvement Task Force. PH.D. in Natural/Resources area with emphasis in riparian ecology required. Experience and/or education in management of western rangelands and forests preferred. Position is located in Las Cruces, NM with state-wide responsibilities. Position requires extensive travel. Familiarity with Land Grant University and Cooperative Extension Service preferred. Send letter of application, including resume, unofficial transcripts, and names, addresses and phone numbers of three references by January 5, 1998 or until position is filled to: **Dr. Ron Parker, Department Head - Animal Resources, NMSU - Box 3AE, Las Cruces, NM 88003. Telephone: (505) 646-1709.**

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