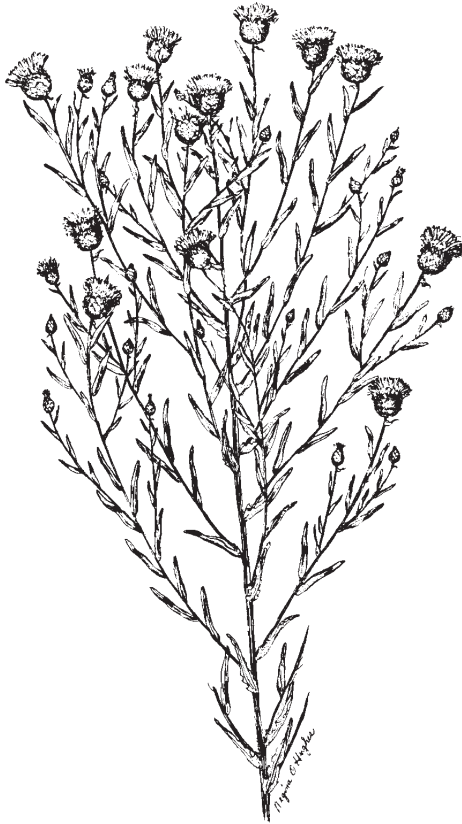


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Weed Survey and Mapping



The primary objective of weed surveying and mapping is to accurately identify and delineate land with populations of invasive plants or noxious weeds. These surveys allow land managers to predict areas that are potentially subject to weed invasion; to understand the biology of the invasion process and determine means by which weeds spread; to develop, implement, and evaluate weed management plans; to assess the economic impact of weed invasions; and to increase public awareness, education, and weed management efforts.

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

Additional information on data recording methods, computer mapping systems, the Global Positioning System (GPS), combining data collected by different methods, software compatibility considerations, and digital base layers available for computer mapping can be found in the publication *Mapping Noxious Weeds in Montana*, Extension Bulletin 148, 1998, available from the Montana State University Cooperative Extension Service Mailing Room (406-994-3273).

Objectives of a Weed Survey and Mapping System

To collect information on weed biology and ecology, including location and acreage infested, growth requirements, and spread patterns and rates.

Use of data for developing weed management goals and objectives.

Establishing a historical database.

Evaluation of the progress of a weed management program.

Increase public awareness and support for the program.

I. Survey Field Methods

- A. Factors Influencing Survey Detail.
 1. Management objectives of the WMA: Surveys can be used to develop baseline information for regional databases, county-wide inventories, local cooperative weed management areas, and eradication programs.

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2. Time constraints of personnel involved in the WMA.
 3. Funding and resources of WMA cooperators.
 4. Terrain of the WMA.
- B. Level of Survey: The level of weed survey utilized is based on the objectives of the weed inventory.
1. Regional and planning weed inventories (Level III): These are reconnaissance surveys used to develop general planning guidelines over large acreages.
 - a. This is the most effective survey for initial planning in a WMA.
 - b. Utilize existing information, including interviews with cooperating landowners, aerial surveys, or “wind-shield” surveys.
 - c. Hand-drawn infestations boundaries on 7¹/₂ to 15 minute topographic maps are acceptable maps for this level.
 - d. Digitize data into a computer mapping system such as Arc View or County CAD.
 - e. This survey is the most economical but the overall level of accuracy is reduced.
 2. Local cooperative projects and county-wide inventories (Level II): These surveys are of moderate detail and accuracy.
 - a. This survey level is best for development of containment and control projects. It is suggested for developing specific management plans within the WMA.
 - b. Hand-drawn infestations boundaries on 7¹/₂ minute (1:24,000 map scale) are acceptable maps for this level.
 - c. Digitize data into a GIS database such as Arc View or CAD mapping system.
 - d. GPS is not necessary for Level II mapping.
 - e. The costs associated with this survey are of a moderate level.
 3. Eradication program inventories (Level I): These surveys are useful when a high level of accuracy and detail is required.
 - a. This survey is most effectively used for the detection of newly invading species or to develop weed eradication programs.
 - b. Survey methods are based on grid systems.
 - c. GPS and GIS systems are highly recommended.

*Visual scan of the area
(Level III)*

*Perimeter mapping method
(Level II)*

*Grid mapping for detailed
inventories
(Level I)*

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- d. This survey is most expensive in terms of both time and dollars.
- C. Mapping Hints.
 - 1. Study aerial photographs, topographic maps, and historical weed data to determine limiting terrain and areas where weeds have been located in the past.
 - 2. Identify “high probability” areas where weed infestations are most likely to start, such as trailhead areas, high traffic areas, disturbed sites, etc.
 - 3. Identify reported weed infestations on the map.
 - 4. Delineate boundaries of the inventory area.
 - 5. Be realistic about what you can accomplish.
 - 6. Conduct the inventory when weeds are most visible, during full flower or in the fall.
 - 7. Don’t inventory more than two species at a time unless infestations are very small and isolated.
 - 8. Develop a search pattern based on the objectives of the inventory.
- D. Equipment Needs.
 - 1. Method of transportation, based on area: 4x4 vehicle, ATV, horses.
 - 2. Maps.
 - 3. Clipboard and color pencils.
 - 4. Two-way radio.
 - 5. Fishing or photography vest.
 - 6. Binoculars.
 - 7. GPS unit (optional).
- E. Summary.
 - 1. Follow a standardized mapping procedure that outlines acreage symbols, weed color codes, and cover class (such as the Montana Mapping Standards) that is agreeable to all cooperators in the WMA.
 - 2. Determine the level of inventory necessary to meet weed management goals and objectives.
 - 3. Develop realistic objectives for the inventory based on funding, time, and terrain.
 - 4. Schedule the inventory when weeds are most visible.
 - 5. Keep inventory areas well defined.
 - 6. Keep inventory methods simple.
 - 7. Remember that weed inventories are a continual update process.

II. Mapping Procedures

- A. Establish Weed Management Area(s). These areas will be delineated through coordination between county weed dis-

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tracts and the WMA cooperators. WMAs are land units that have similar characteristics such as geography, weed problems, climate, or common interest and funding support. Boundaries may be a watershed divide or other geographic feature. This eliminates jurisdictional boundaries that are barriers to effective weed control in favor of natural boundaries that are barriers to the spread of weeds.

- B. Complete noxious weed management maps and an inventory of the weeds in the WMA.
 - 1. Weed survey maps may be created by hand-drawing infestation boundaries on base maps, using a computerized mapping system, such as Arc View or County CAD, or by collecting location coordinates of weed infestations using Global Positioning System (GPS) technology.
 - 2. When weed infestations are hand-drawn on base maps, USGS 1:24,000 scale (7¹/₂ minute series) maps should be used.
 - 3. In areas 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.
 - 4. Aerial photos and maps must be geodetically corrected for weed data to be digitized into a GIS database.
- C. Certain features should be common to all noxious weed management maps. Use clear overlays to show additional features. The base maps should show:
 - 1. Weed infestations by species.
 - 2. Topographic features.
 - 3. Man-made features, such as roads, trails, power lines, railroads, irrigation canals, and ditch systems.
 - 4. Jurisdictional boundaries, such as state lands, federal lands, cemeteries, etc.
 - 5. Vegetative types and soil types.
 - 6. Sensitive areas, such as wetlands, distance to groundwater, and threatened, endangered and sensitive species.

III. Infestation Delineation

Weeds should be delineated by a standardized method of marking infestation locations, acreage estimates, and level of infestation by individual species.

- A. Procedure.

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1. Map weed infestations using the following symbols on the mapped area to indicate approximate size and location of the infestation.
 - θ = area was mapped, no weed infestations found
 - 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
 2. Five letter WSSA codes or other approved designations should be used to indicate the weed species. (*See Appendix 13.*)
 3. Color codes may be used on local maps to make infestations more visible. Make sure the color key is included on the map.
 4. Use the following symbols to indicate the infestation level (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): greater than 25% cover
- B. Baseline Information: Weed Database Programs
1. A good inventory of baseline data provides WMA cooperators information to help evaluate weed management options. A list of important elements can be found in *Appendix 9*.
 2. Weed database programs can be used to help chart progress in the WMA and assist in planning and budgeting an effective multi-year plan. Databases give uniformity to data entry, better organized information storage, and easy retrieval of data. They can be used to monitor infestation trends and treatment and can be used as a planning tool.
 - a. Many land management agencies have developed effective databases to track weed management programs. References can be found in *Appendix 9*.
 3. All maps to be digitized should be accompanied by a **metadata form**. See *Appendix 9* for an example.

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