

## **Protocol for Reconnaissance-Level Mapping of Invasive Plants**

*Sources:* California Weed Mapping Handbook, September 2002, CA Department of Food and Agriculture; CA State Parks' IMAP (Inventory and Monitoring Protocols) for Invasive Alien Plants.

*Background:* The Mendocino Coast Cooperative Weed Management Area (MCWMA) is seeking to map invasive plant distributions along the Mendocino Coast. Big River Stewards, a program of the Mendocino Land Trust, is also working collaboratively with the Department of Parks to map and address invasive plants in the new Big River State Park unit in the lower Big River estuary. The MCWMA has adopted a three-protocol system, including: 1) a coarse-scale Roadside presence-only survey, done for weeds at approximately a 1-mile resolution throughout the WMA 2) a medium-resolution protocol, termed "Reconnaissance-level," appropriate to volunteers for mapping individual weed infestations at a scale and resolution appropriate for property and landscape-level prioritization and planning, and 3) a professional-level site-specific survey for characterizing weed populations at the level needed by agencies and landowners to support environmental documentation and site-specific remediation.

This document regards the Reconnaissance-level, strategic survey protocol. It is adapted from the CDFA Weed Mapping Protocols and meets the California State Parks IMAP criteria for a Reconnaissance-level rapid assessment of invasive alien plant occurrences or Baseline field-oriented survey seeking to address the generalized distributions and intensity of particular invasive plants in within a project area (such as the Big River Unit). Due to the fact that volunteers will be trained in the identification and survey of particular species already known to be invasive to an area, this will not be considered a comprehensive biological field survey for all possible invasive plant occurrences.

*Overview:* The method is designed as follows:

- To be easy enough to allow trained volunteers to collect spatial and plant population information efficiently at approximately a 10-meter minimum resolution (typical of hand-held consumer-level GPS), with generalized information about plant cover, plot size, distribution and composition.
- To be quick enough to cover significant areas of property in a comprehensive manner, estimated for a two person team to be approximately 1/2 road mile per hour via foot.
- To be most effective when pursued along existing road corridors, but also appropriate to off-road field survey.
- To be compatible with information collection guidelines for the WMA, State Parks, and for State-wide invasive plant management systems and protocols, particular WIMS.
- To allow for GIS mapping of plant populations appropriate for prioritization and planning of treatment efforts.

*Methodology:*

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Volunteers will be trained in the use of a hand-held commercial grade GPS system, for the following skills:

- Geographical concepts and coordinate systems necessary to recording geographic locations.
- Understanding GPS accuracy issues in the field and making error estimates.
- Navigation and orienteering in the field using base maps.
- Taking point location measurements using GPS. Volunteers will not be trained in the use of tracks or other multi-point recording features.

Additional training will include:

- Plant identification, with an emphasis on target species of concern.
- Procedures for defining “Patches” of invasive plants. A Patch is defined as the basic mapping unit for an invasive plant occurrence, which exhibits generally homogenous and continuous coverage within it with individuals of the species spaced no further than 20m from one another. Individuals further than 20m from a patch should be included within another patch or can be noted as individual “outliers.”
- Coverage area estimation using cover classes.
- Field mapping techniques: field compass use, distance estimation, pacing, identifying and measuring patch boundaries, acquiring off-set benchmarks due to bad GPS coverage inside patches, etc.
- Field safety, interaction with the public, etc.

Volunteers will traverse roads on the Big River Unit, looking for patches of known invasive plants. Using field forms and hand-held GPS, they will record patches of particular plants to a level suitable for GIS mapping. When necessary to characterize a patch, volunteers may take digital photos of populations from recorded photopoints.

### *Data Collection:*

It is suggested that a field form be adapted for use from the CDFA Weed Observation and Monitoring Form (see appendix of CDFA Weed Mapping Handbook).

Information to be collected for each survey:

- Date: YYYYMMDD format.
- Collector’s names and contact info (may be catalogued elsewhere).
- Location and general site description. In the case of Big River, this could be “Big River State Park, eastern haul road.”
- County w/ FIPS code: Mendocino is 06045, county #23.
- Coordinate System and Datum (should be same throughout any survey – recommend UTM for coordinate system, NAD 83 or WGS 84 for datum, depending on other local base data being used).

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- Description of the area surveyed, describing boundaries either in words or with geographic reference information.

Information to be collected for each patch:

- Patch number: numeric and sequential for each survey
- Patch type:
  - Point/circle (recorded with a single point location and estimated diameter), used for patches smaller than 40 m in diameter (20m radius).
  - Linear (recorded with road or stream identifications, start, intermediate, finish points, patch width); used for infestations along roads or streams greater than 40 m in length, with an average width away from linear feature measured
  - Polygon (recorded with individual boundary points), used for areal infestations larger than 40 meters in diameter with irregular boundaries.
- Geographic location: GPS points for road locations, centers of patches, or patch boundaries, depending on type.
- The reference waypoint number for each point recorded on the GPS.
- Patch area/dimensions: an estimate of overall patch size in square meters. Dimensions of the infestation may be paced or measured by hand-held tape if needed. Categorized into classes: 1-4 m<sup>2</sup> (<2x2m), 4-25m<sup>2</sup> (<5x5m), 25-100m<sup>2</sup> (<10x10m), 100-400m<sup>2</sup> (<20x20m), 400-1600m<sup>2</sup> (<40x40m), 1600m<sup>2</sup>+. Larger patch sizes can be determined from polygon areas.
- Cover class: <1%, 1-5%, 5-25%, 25-50%, 50-75%, 75-95%, 95-100%.
- Species. Primary infestation species; other major component species may be recorded (separate cover class estimates can be made for each).
- Vegetation type:
  - North Coast Conifer (NC)
  - Pygmy Cypress (PC)
  - Bishop Pine (BP)
  - Coastal Bluff Scrub (CB)
  - Dune (DN)
  - Wetland (swamp to bog) (WT)
  - Riparian, river or creek bank (RP)
  - Urban (U)
  - Grassland (G) Oak Woodland (OW)
- Location offsets if used to locate patch (directions and distances from fixed points).
- Estimate of data accuracy: as recorded by GPS, adjusted by knowledge of associated factors (PDOP, etc.). <5m, 5m-20m, 20m-100m, >100m (non-GPS measurement).
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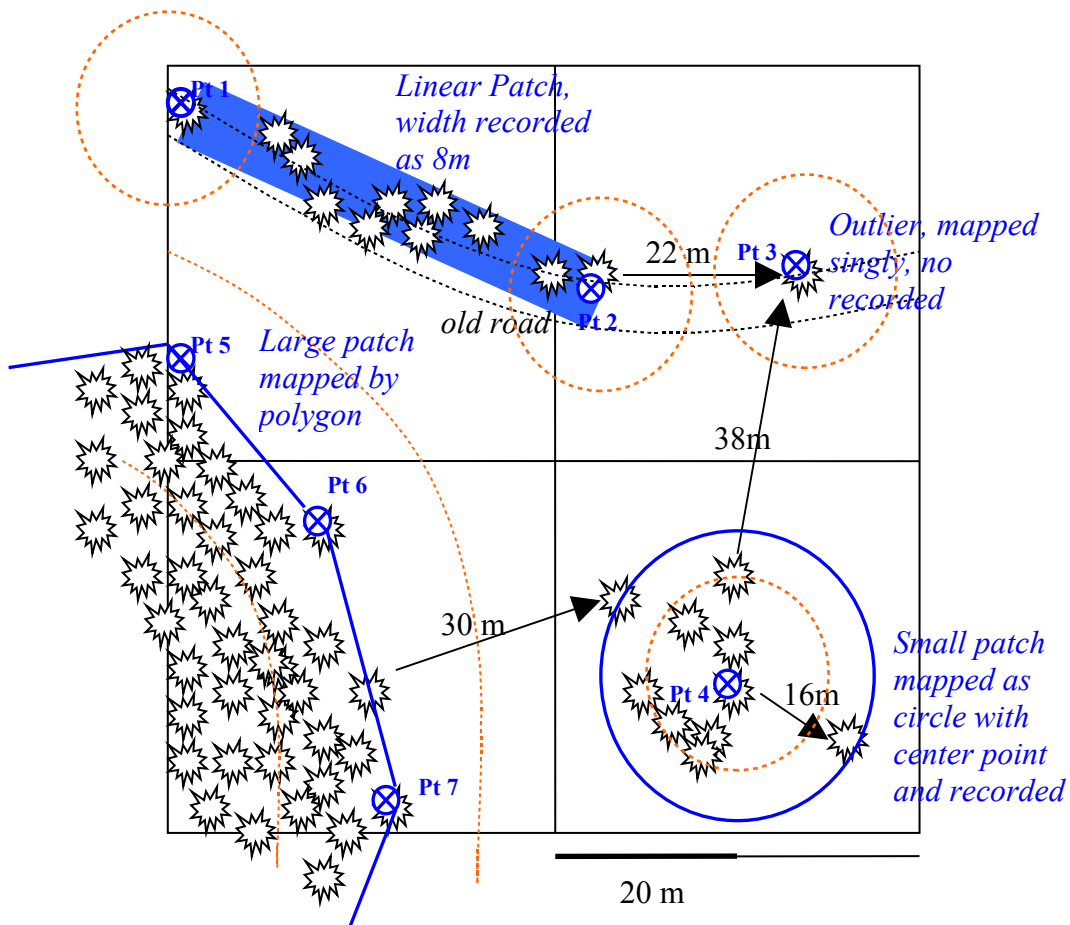
*Data Use:*

Field-collected data will be:

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- Downloaded or entered into a GIS system database, and mapped at the resolution appropriate to the level of survey data recorded.
- Attempts should be made to provide comprehensive survey coverage of particular project areas for particular species of concern rather than intensive coverage of every possible plant occurrence. Detailed follow-up surveys can be performed later by professionals or more-highly trained volunteers on particular areas deemed priorities.
- Compiled maps should be prepared with complete metadata done up to federal metadata standards.
- Maps should be used for general plant distribution and prioritization of potential treatments/management strategies; these level data should not be considered specific nor comprehensive enough for CEQA or NEPA level environmental review of restoration projects, etc.
- Data should be collected and regarded under a “Positive Identification” principle – i.e. data are collected to indicate the positive presence of an invasive plant population, but lack of data should not conversely be construed to indicate the lack of invasives. While positive identification of the absence of plants can be done (recording the sites and extents of gaps in invasive plants – i.e. where they are not located), these data are not being recommended for collection under this protocol. Monitoring of particular areas of special high value for the continued lack of invasive plants should be done under a separate protocol.

**Invasive Plant Mapping Example:**



Example of invasive plant mapping using Reconnaissance-level survey on an 80 meter by 80 meter area traversed by an old road (black dotted line) and clogged with Jubata grass.

Blue x-circles represent GPS points recorded in the field, while orange lines/circles depict 10-meter error estimates surrounding each point.

These are used to delineate four patches, as follows:

1. A patch is located on the road and characterized due to being over 40 m in length and generally linear (no plants extending further than 10 m from the line). A GPS point is recorded on either end of the patch, which is ended when a gap of over 20m is encountered. If the road curved, additional points could be taken to characterize the line. A measured width for the line of 8m is estimated or paced off.
2. Another plant located on the same road, but with greater than 20m gap in coverage. It is recorded with a single GPS point, and marked as an outlier.

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3. A patch of scattered plants is located on a bank down-slope, with approximately 10 plants within a circular area 32m in diameter. A central point is located and a radius of 16m is recorded.
4. A large area of jubata is located on the large landing flat below the road, with greater than 40m diameter extent. A series of GPS points are taken (at greater than 20 m intervals) along the perimeter of the patch.

**Note** points as recorded can be as far as 10 m away from real locations given normal recreational GPS accuracy. Other factors can increase this uncertainty. On eventual map, relative positions of points could look different, but at minimum mapping scales selected, there will be confidence in distinguishing patches from one another.