

**Inventory & Monitoring Protocols – Invasive Alien Plants**  
 One time use of any of these levels is inventory, monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• What invasive alien plant taxa are known to occur in the unit?</li> <li>• What plant communities at the unit are known to be invaded by invasive alien plants?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct literature and database searches <b>(1, 4)</b></li> <li>• Consult with knowledgeable persons and agencies <b>(4)</b></li> <li>• Review any existing documents for the site <b>(4)</b></li> <li>• Visit herbaria</li> </ul>	<ul style="list-style-type: none"> <li>• A list of invasive alien plant taxa that have been documented in the unit from past site visits or studies.</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<ul style="list-style-type: none"> <li>• What invasive alien plant occurrences exist at the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Walk-through, drive-by, fly-over, and look at photos of the site</li> <li>• Create a list of invasive plant taxa observed during site visits <b>(5, 6, 7, 8, 9, 10 for help with identification of some invasive taxa and eradication techniques).</b></li> <li>• Have experts verify taxa in question.</li> <li>• Take general photos <b>(3)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Products of the Preliminary Level plus:</li> <li>• A list of invasive alien plant taxa observed at the site during site visits</li> <li>• Completed annual inspection &amp; questionnaire</li> <li>• Rapid assessment of invasive alien plant occurrences</li> </ul>
<b>Baseline</b> (field-oriented)	<ul style="list-style-type: none"> <li>• Where are the invasive alien plant occurrences located in the unit?</li> <li>• Is the invasive alien plant occurrence new or absent compared to previous years?</li> <li>• Is there an apparent change in the taxon or its habitat at the site of the occurrence compared to previous years?</li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Preliminary Level plus:</li> <li>• Visit the unit with aerial photographs and topographic maps and systematically search the suitable habitat on foot during the appropriate blooming period (for taxa that must be blooming for proper identification). <b>(1)</b></li> <li>• Establish photo stations, make general observations of the site, and note associated taxa. <b>(3)</b></li> <li>• Use the Sawyer-Keeler-Wolf plant communities classification system to identify plant at the unit where invasive alien plant taxa are observed. <b>(2)</b></li> <li>• Use a Global Positioning System (GPS) unit to create a map of plant taxa locations as points in GIS. Map and number each occurrence.</li> <li>• Outline the surveyed area by hand onto a topographic map.</li> <li>• Use the ArcView or ArcInfo software to generate maps.</li> <li>• Compare maps year to year to ascertain change (Monitoring).</li> </ul>	<ul style="list-style-type: none"> <li>• A comprehensive list of the invasive alien plant taxa occurrences at the unit and the associated taxa.</li> <li>• A comprehensive list of the plant communities at the unit where invasive alien plant taxa occurrences exist.</li> <li>• GIS map with invasive alien plant taxa locations at the unit mapped as points or polygons.</li> <li>• A map of the surveyed area.</li> <li>• Photos of taxa and/or populations.</li> </ul>
<b>Baseline</b> (field-oriented)	<ul style="list-style-type: none"> <li>• What is the areal extent of the invasive alien plant occurrences in the unit?</li> <li>• What is the change in areal extent of the invasive alien plant occurrences?</li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Preliminary Level plus:</li> <li>• Map the stand or population perimeters as polygons using a GPS unit (some stands of larger taxa may be mapped using digital imagery in ArcView or ArcInfo).</li> <li>• Map entire area surveyed on a topographic map or GIS map, or by using digital imagery in ArcView or ArcInfo.</li> <li>• Create a GIS map using the ArcView or ArcInfo software.</li> <li>• Repeat the above periodically and compare results to previous years (Monitoring).</li> </ul>	<ul style="list-style-type: none"> <li>• Products of the Preliminary Level plus:</li> <li>• GIS map of invasive alien plant occurrences and the entire area surveyed.</li> <li>• Calculation of acreage of each occurrence or of all occurrences of a particular taxon using GIS.</li> </ul>
<b>Comprehensive</b> (field oriented)	<ul style="list-style-type: none"> <li>• How many individuals of the invasive alien taxon are present in each occurrence?</li> <li>• What is the phenology of the taxon, and condition of individuals in the occurrence?</li> <li>• What is the species composition or richness, dominant taxa, condition of habitat, percent cover by species, relative abundance, height classes, distribution of the taxa,</li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Preliminary Level plus:</li> <li>• Establish transects and/or quadrats to collect data on numbers, phenology, disease, predation, mortality, etc., in all or a subset of the occurrences at the unit. <b>(4)</b></li> <li>• Establish transects and/or quadrats to collect data on %cover, relative abundance, recruitment, height classes, mortality or disease. <b>(4)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Products of the Preliminary Level plus:</li> <li>• Data on abundance, frequency, density, richness, cover, condition of occurrence and habitat, mortality, etc.</li> <li>• Detect changes and trends in the above.</li> <li>• Map of transect and quadrat locations.</li> </ul>

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Survey Level	Questions	Methods	Products
	reproduction/recruitment rate, timing of phenological changes, frequency, density of the taxon within the occurrence? • What are the changes in the above-mentioned attributes?	<ul style="list-style-type: none"> <li>• Use appropriate statistics to analyze data. <b>(4)</b></li> <li>• Map locations of transects and quadrats using GPS unit.</li> <li>• Create a GIS map using the ArcView or ArcInfo software.</li> <li>• Repeat the above periodically and compare results to previous years (Monitoring).</li> </ul>	
<b>Intensive</b> (field & laboratory-oriented)	<ul style="list-style-type: none"> <li>• Questions related to demographics, genetics, energy/nutrient cycling, pollination biology, etc.</li> <li>• How are the population demographics or other attributes changing?</li> </ul>	<ul style="list-style-type: none"> <li>• Methods will be dependent upon the nature of the question and the taxon. Standard protocols, when available and applicable, should be employed.</li> <li>• Repeat the above periodically and compare results to previous years (Monitoring).</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed and intensive studies and reports on an attribute of interest with regard to an invasive alien plant taxon or occurrence specifically.</li> <li>• Detect changes and trends.</li> </ul>

## Inventory & Monitoring Protocols – Invasive Alien Taxa

### References:

- 1) Barry J. 2000. *Handbook for Vegetation Inventory Monitoring and Assessment of the California State Park System*. (unpublished report). Obtain from the California State Parks Headquarters IMAP team, Sacramento
- 2) Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation*. Published by the California Native Plant Society. 471pp. ISBN (softcover) 0-943460-26-2. The ISBN (hardcover) is 0-943460-25-5. Obtain a copy by ordering from the California Native Plant Society, 1722 J Street, Suite 17, Sacramento, CA 95814. Phone 916-447-2677. Or order on the California Native Plant Society Bookstore website at: [www.CNPS.org/bookstore/sellers.htm](http://www.CNPS.org/bookstore/sellers.htm)
- 3) Magil, A.W. 1989. *Monitoring Environmental Change with Color Slides*. General Technical Report PSW-117. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Dept. of Agriculture. 55pp. To obtain contact: Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, CA 94701 or online at the USDA Forest Service Pacific Southwest Research Station Publications website at: [www.psw.fs.fed.us/techpub.html](http://www.psw.fs.fed.us/techpub.html)
- 4) Elzinga, C.L., D.W. Salzer, J.W. Willoughby, & J.P. Gibbs. 2001. *Monitoring Plant and Animal Populations*. Blackwell Science, Inc., Massachusetts. 360 pp. ISBN (softcover) 0-632-04442-X. Obtain copy from on-line bookstores.
- 5) U.S. Department of Agriculture Exotic & Invasive Weeds Research Unit website at: <http://wric.ucdavis.edu/exotic/exotic.htm>
- 6) California Exotic Pest Plant Council (CalEPPC) website: [www.caleppc.org](http://www.caleppc.org)
- 7) Calweed Database website at: <http://endeavor.des.ucdavis.edu/weeds>
- 8) California Department of Food and Agriculture, *Encycloweedia* website at: <http://pi.cdfa.ca.gov/weedinfo/>
- 9) Robbins, W.W., Margaret K. Bellue, and Walter S. Ball. 1970. *Weeds of California*. 547 pp. The book can be purchased by contacting Documents and Publications, P.O. Box 20191, Sacramento, CA 95820
- 10) Bossard, Carla C., J.M. Randall, and Marc C. Hoshovsky, eds. 2000. *Invasive Plants of California's Wildlands*. 360 pp. ISBN is 0-520-22547-3. The book may be purchased at various bookstores or through Amazon.com