

Inventory & Monitoring Protocols – Sensitive Plants One time use of any of these levels is inventory, monitoring requires multi-time use.			
Survey Level	Questions	Methods	Products
Preliminary (office-oriented)	<ul style="list-style-type: none"> What sensitive plant taxa are known to occur, or could potentially occur, in the unit? What plant communities at the unit are known to support, or might support, sensitive plant occurrences? 	<ul style="list-style-type: none"> Conduct literature and database searches (1, 4, 5, 6) Consult with knowledgeable persons and agencies (4) Review any existing documents for the site (4) Visit herbaria Visit known sensitive plant occurrences 	<ul style="list-style-type: none"> A list of sensitive plant taxa that occur, or could occur, in the unit based upon their habitat affinities and ranges.
Reconnaissance (field-oriented)	<ul style="list-style-type: none"> What are the plant communities that exist at the unit and where are they located? What sensitive plant occurrences are known to occur at the unit and where are they located? 	<ul style="list-style-type: none"> Walk-through, drive-by, fly-over, and look at photos of the site 	<ul style="list-style-type: none"> Completed annual inspection & questionnaire Rapid assessment of sensitive plant occurrences
Baseline (field-oriented)	<ul style="list-style-type: none"> What sensitive plant occurrences exist at the unit? 	<ul style="list-style-type: none"> Methods outlined in the Preliminary Level plus: Conduct site visits to all suitable habitat types during the appropriate blooming period (for the taxa that must be blooming for proper identification) and conduct a search for the taxa. (1, 8) Take photos, make general observations of the site, note associated taxa. (3) Have experts verify the identification of taxa that are in question. (Guidelines are currently being developed regarding the collection of sensitive plant taxa for voucher specimens. Please contact the IMAP Program Manager for information on this issue before collecting any specimens.) Use the Sawyer-Keeler-Wolf plant communities classification system to identify plant communities that support sensitive plant taxa at the unit. (2) 	<ul style="list-style-type: none"> A list of all sensitive plant taxa seen at the unit A comprehensive list of the sensitive plant taxa occurrences at the unit and the associated taxa. (Note: although a taxon may not have been detected during the site visits, it is not necessarily absent.) A list of plant communities at the unit that support sensitive plant taxa.
	<ul style="list-style-type: none"> Where are the sensitive plant occurrences located in the unit? Is the sensitive plant occurrence new or absent compared to previous years? Is there an apparent change in the taxon or its habitat at the site of the occurrence compared to previous years? 	<ul style="list-style-type: none"> Methods outlined in the Preliminary Level plus: Visit the unit with aerial photographs and topographic maps and systematically search the suitable habitat on foot. Establish photo stations. (3) Use a Global Positioning System (GPS) unit to create a detailed map of plant taxa locations as points or polygons in GIS. Map and number each occurrence. Outline the surveyed area by hand onto a topographic map. Use the ArcView or ArcInfo software to generate maps. Compare maps year to year to ascertain change (Monitoring). 	<ul style="list-style-type: none"> GIS map with sensitive plant species locations at the unit mapped as points or polygons. A map of the surveyed area. Photos of taxa and/or populations.

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Survey Level	Questions	Methods	Products
Baseline (field-oriented)	<ul style="list-style-type: none"> What is the areal extent of the sensitive plant occurrences in the unit? What is the change in areal extent of the sensitive plant occurrences? 	<ul style="list-style-type: none"> Methods outlined in the Preliminary Level plus: 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). Map entire area surveyed on a topographic map or GIS map, or by using digital imagery in ArcView or ArcInfo. Create a GIS map using the ArcView or ArcInfo software. Repeat the above periodically and compare results to previous years (Monitoring). 	<ul style="list-style-type: none"> Products of the preliminary level plus: GIS map of sensitive plant occurrences and the entire area surveyed. Calculation of acreage of each occurrence or of all occurrences of a particular taxon using GIS.
Comprehensive (field-oriented)	<ul style="list-style-type: none"> How many individuals of the sensitive taxon are present in each occurrence? What is the phenology of the taxon, and condition of individuals in the occurrence? What is the species composition or richness, dominant taxa, condition of habitat, percent cover by species, relative abundance, height classes, distribution of the taxa, reproduction/recruitment rate, timing of phenological changes, frequency, density of the taxon within the occurrence? What are the threats or impacts to the population? What are the changes in the above-mentioned attributes? 	<ul style="list-style-type: none"> Methods outlined in the Preliminary Level plus: Establish transects and/or quadrats to collect data on numbers, phenology, disease, predation, mortality, threats, etc., in all or a subset of the occurrences at the unit (4). Establish transects and/or quadrats to collect data on %cover, relative abundance, recruitment, height classes, mortality or disease (4). Use appropriate statistics to analyze data (4). Map locations of transects and quadrats using GPS unit. Create a GIS map using the ArcView or ArcInfo software. Repeat the above periodically and compare results to previous years (Monitoring). 	<ul style="list-style-type: none"> Products of the Preliminary Level plus: Data on abundance, frequency, density, richness, cover, condition of occurrence and habitat, mortality, etc. Detect changes and trends in the above. Map of transect and quadrat locations.
Intensive (field & laboratory-oriented)	<ul style="list-style-type: none"> Questions related to demographics, genetics, energy/nutrient cycling, pollination biology, etc. How are the population demographics or other attributes changing? 	<ul style="list-style-type: none"> Methods will be dependent upon the nature of the question and the taxon. Standard protocols, when available and applicable, should be employed. Repeat the above periodically and compare results to previous years (Monitoring). 	<ul style="list-style-type: none"> Detailed and intensive studies and reports on an attribute of interest with regard to a sensitive plant taxon or occurrence specifically. Detect changes and trends.

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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
- 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
- 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) Skinner, M.W., and B.M. Pavlik, eds. 1994. *Inventory of Rare and Endangered Vascular Plants of California*. California Native Plant Society Special Publication No. 1 (Fifth Edition). Sacramento, CA vi+338pp. 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
- 6) California Natural Diversity Database (CNDDB). California Department of Fish and Game. Sacramento, CA 95814 or visit the California Department of Fish and Game, Wildlife and Habitat Data Analysis Branch website at: www.dfg.ca.gov/whdab/html/cnddb.html
- 7) The U.S. Fish and Wildlife Service Species Information website at: <http://endangered.fws.gov/wildlife.html#Species>
- 8) The Department of Fish and Game, California Natural Diversity Database (CNDDB) website at: <http://www.dfg.ca.gov/whdab/guideplt.pdf> for *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities* that outlines DFG recommendations for surveying for sensitive plant taxa.