California Native Plant Society
2707 K Street, Suite 1, Sacramento, CA 95816-5130 (916) 447.2677 www.cnps.org

Protecting California's native flora since 1965

California Native Plant Society

POLICY ON ETHICS AND BEST PRACTICES FOR COLLECTING NATIVE PLANTS

(PS-20)

Adopted 05 December 2020

Policy Statement

Botanical collections are the forefront of biodiversity research and play a crucial role in major fields of biological sciences, including the study of taxonomy and systematics, biogeography, biological invasions, global climate change, evolution, conservation, and sustainability, in addition to leading to new species and phytochemical discovery. The California Native Plant Society (CNPS) encourages the ethical collection of native plants for appropriate uses such as: herbarium voucher specimens, research material, biochemical assay, anatomical study, educational material, and for incorporation of plants, seeds or cuttings in botanic gardens and arboreta. Collection of plants should be conducted using best practices and ethical standards whether they are common, rare, threatened, endangered, or otherwise noteworthy. Below we provide some key current best practices that collectors should follow.

Intent

- To foster and promote the collection of plants in a respectful manner that does not impact the population's capacity to reproduce and thrive nor negatively impact the condition, ecological processes or aesthetics of the habitat and surrounding environment.
- To ensure that collected material is or can be used in a manner that contributes to the science, understanding, appreciation, and/or preservation of native plants in a meaningful way.
- To support documentation by plant voucher, seed, and living material collecting that contributes to the conservation or recovery of rare species.
- To serve as supportive material and justification for obtaining plant voucher, seed, and living material collecting permits.

This policy is directed toward field biologists and researchers and is a companion to other CNPS policies that pertain to collecting native plants, namely, "Guidelines for Chapters to Reduce Impacts to Native Plants" (1993 [CBAI-93a]), "Policy with regard to Plant Collecting for Educational Purposes" (1993 [CBAI-93b]), and "Collecting Guidelines and Documentation Techniques" (1995 [PS-95]).

Best Practices and Ethical Standards

1) Collectors should not illegally trespass and should acquire necessary permits prior to making plant collections.

2) Field collectors should adhere to the CNPS Collecting Guidelines and Documentation Techniques[1].

3) Field collections should be made discreetly. If collecting adjacent to well utilized areas (such as directly adjacent to trails, roads, infrastructures and other areas of high-visibility and/or high profile), collectors should try to avoid collecting in direct public eyesight and be prepared to effectively explain their work and how it positively impacts the scientific community. Avoid collecting plants that are landmark representatives of a population and avoid unnecessary damage to the site and its aesthetic values.

4) Field collectors should always use good judgment and best practices to avoid the spread of disease, noxious weeds, and other undue harm to plants and the natural environment. Avoid collecting from plants or populations that look obviously diseased. Periodically and regularly clean and sterilize field equipment as necessary to prevent dispersal of soilborne pathogens. Regularly check clothing, boots/laces for noxious weed seeds, and remove any seeds prior to heading out into the field or to a new location.

5) For educational purposes, groups of students should be directed away from sensitive areas in the field, taking extra care not to trample the site. Frequent consecutive visits to the same site should be avoided. For classroom use, only plants that are both common in the region and common at the site should be collected. Refer to “Policy with Regard to Plant Collecting for Educational Purposes” [CBAI-93b] for additional guidelines pertaining to collections for education.

6) Sampling should be adjusted downward depending on population size and seed production; collect no more than ten percent (10%) of the total seed produced and no more than five percent (5%) of the population for vouchers in any given year. If the population size will allow and the taxon is poorly known, material for multiple vouchers should be taken throughout the population so that full variation is approximated in the sample, and so that material can be deposited and secured in multiple herbaria for study and preservation.

7) At least one voucher of a collected specimen should be deposited in a participating herbarium of the Consortium of California Herbaria[2] in California along with one hard copy and digital copy of label, or other media preferred by the receiving herbarium. If material is taken for multiple vouchers, specimens should preferably be sent to two or more separate participating herbaria.

8) All voucher specimens, and at least a portion of seed collections not already accessioned in a seed bank, should be deposited in herbaria or seed banks as soon as they are sufficiently dried or at least within one year of collecting in order to avoid undue harm to the specimens or seeds, ensure their long-term preservation, and to make them available to the scientific community. If depositing more than 10 voucher specimens or more than 1,000 seeds, consider providing curation funding for the chosen herbaria or seed bank to help them produce labels,

curate electronic data, and mount and store the submitted specimens or seeds in perpetuity. Funding for this purpose should be written into any contracts or grants that will require this service when possible.

9) Obtain a voucher collection permit[3] from the California Department of Fish and Wildlife before collecting state listed rare, threatened or endangered plants, or candidate species. A collector of Special Status Plants[4], including any plant in the *CNPS Inventory of Rare and Endangered Plants*[5], should report their findings to the California Department of Fish and Wildlife's Natural Diversity Database (CNDDB)[6] within one year of such a discovery.

10) While observing all of the above ethics and best practices, we strongly encourage and promote voucher collections of rare and common plants if one or more of the following conditions apply:

a. the identity of the plant requires confirmation;

b. most existing voucher specimens lack the key characteristics necessary for identification;

c. the plant occurs in an unusual habitat, or if there is an indication of azonal or other change in habitat;

d. it is a new or suspected new occurrence[7], unknown previously to the botanical community; e. it is a known occurrence for which no voucher specimen exists in a participating herbarium of the Consortium of California Herbaria[2];

f. all existing voucher specimens lack viable material for DNA sequencing, or fresh plant material is needed for research, biochemical assay, anatomical study, and/or for conservation in an arboretum or seed bank;

g. no vouchers have been collected within the past 5-7 years (for annuals) or 10-15 years (for perennials) and the population has not been adequately vouchered or over-collected (e.g., there is not a significant number of vouchered specimens already from the same population).

---

1 CNPS Collecting Guidelines and Documentation Techniques – CNPS Policy. Adopted 4 March 1995. Available at: https://www.cnps.org/conservation/policies/

2 Participants of the Consortium of California Herbaria are provided at: https://ucjeps.berkeley.edu/consortium/participants.html

3 Plant Voucher Collecting Permit Application: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=44384&inline

4 "Special Status Plants" is a broad term used to refer to all the plant taxa inventoried by the Department of Fish and Wildlife's California Natural Diversity Database (CNDDB), regardless of their legal or protection status.

5 California Native Plant Society, Rare Plant Program. 2016. *Inventory of Rare and Endangered Plants of California* (online edition). Website http://www.rareplants.cnps.org.

6 Information on submitting data to the CNDDB is available at: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data

7 According to the CNDDB, a plant "occurrence" in California is defined as a population or group of populations found within ¼ mile of each other and not separated by significant habitat discontinuities.

Appendix

Rationale

Botanical collections are the forefront of biodiversity research and play a crucial role in major fields of biological sciences, including the study of taxonomy and systematics, biogeography, biological invasions, species and phytochemical discovery, global climate change, evolution, conservation, and sustainability (Snow and Keating 1999, Dolan et al. 2011, Suarez and Tsutsui 2004, Bebber et al. 2010, Hurka and Neuffer 2011, Rivers et al. 2011, Lulekal et al. 2012, Tripp and Hoagland 2013, Thiers 2014, Landrum and Lafferty 2015, Powney and Isaac 2015, Buerki and Baker 2016). Plant vouchers provide the most reliable confirmation of a plant's presence on the landscape, and often lead to the discovery of new species (Bebber et al. 2010, Taylor 2014) and new phytochemicals for medicine (Eisenman et al. 2012, Bussmann 2015). As habitat loss accelerates, seed and living plant collections are increasingly needed to preserve plant genetic diversity in *ex situ* conservation (Hoban and Schlarbaum 2014), and are also essential for biological studies involving population genetics and common greenhouse experiments (Burge et al. 2013). The collection of new plant material for biological studies is increasingly important, yet is in decline, partly due to budgetary shortfalls, as well as the increased challenge of governmental restrictions on collecting and the related complications with permitting processes (Suarez and Tsutsui 2004, Tripp and Hoagland 2013, Taylor 2014). Furthermore, complications can arise from the lack of proper specimen vouchering, which can lead to serious problems for some research projects, and therefore the use of best practices in specimen collection is critical for successful documentation and scientific study (Eisenman et al. 2012). The core function of the *CNPS Policy on Ethics and Best Practices for Collecting Native Plants* is to promote the collection of plants in an ethical manner that provides the most meaningful contribution to science and conservation, while also serving as supportive material and justification for obtaining plant and seed collecting permits.

Literature Cited

Bebber, D.P., M.A. Carine, J.R.I. Wood, A.H. Wortley, D.J. Harris, G.T. Prance, G. Davidse, J. Paige, T.D. Pennington, N.K.B. Robson, and R.W. Scotland. Herbaria are a major frontier for species discovery. *PNAS* 107(51): 22169-22171.

Buerki, S. and W.J. Baker. 2016. Collections-based research in the genomic era. *Biological Journal of the Linnean Society* 117: 5-10.

Burge, D. O., R. Hopkins, Y.-H. E. Tsai, and P. S. Manos. 2013. Limited hybridization across an edaphic disjunction between the gabbro-endemic shrub *Ceanothus roderickii* (Rhamnaceae) and the soil-generalist *Ceanothus cuneatus*. American Journal of Botany 100:1883-1895.

Bussmann, R.W. 2015. Chapter 4: Taxonomy-An Irreplaceable Tool for Validation of Herbal Medicine. Pp. 87-118 *in:* P.K. Mukherjee (ed.), Evidence-Based Validation of Herbal Medicine. Elsevier, Inc. https://doi.org/10.1016/B978-0-12-800874-4.00004-0

Dolan, R.W., M.E. Moore, and J.D. Stephens. 2011. Documenting effects of urbanization on flora using herbarium records. *Journal of Ecology* 99: 1055-1062. doi: 10.1111/j.1365-2745.2011.01820.x

Eisenman, S.W., A.O. Tucker, and L. Struwe. 2012. Voucher specimens are essential for documenting source material used in medicinal plant investigations. *Journal of Medicinally Active Plants* 1(1): 30-43. http://scholarworks.umass.edu/jmap/vol1/iss1/8

Hoban, S. and S. Schlarbaum. 2014. Optimal sampling of seeds from plant populations for ex-situ conservation of genetic biodiversity, considering realistic population structure. *Biological Conservation* 177: 90-99. https://doi.org/10.1016/j.biocon.2014.06.014

Hurka, H. and B. Neuffer. 2011. Geschichte und Bedeutung von Herbarien. Osnabrücker Naturwissenschaftliche Mitteilungen 37:1115-134.

Landrum, L.R. and D. Lafferty. 2015. Proximity and Correlation: Two new computer programs for mining phytosociological information held in herbarium databases using central Arizona as a test case. *Taxon* 64(5): 998-1016.

Lulekal, E., Z.A. Ensermu Kelbessa, and P. Van Damme. 2012. Linking ethnobotany, herbaria and flora to conservation: The case of four angiosperm families at the National Herbarium of Ethiopia. *Journal of East African Natural History* 101(1): 99-125.

Powney, G.D. and N.J.B. Isaac. 2015. Beyond maps: A review of the applications of biological records. *Biological Journal of the Linnean Society* 115: 532-542.

Rivers, M.C., L. Taylor, N.A. Brummitt, T.R. Meagher, D.L. Roberts, and E.N. Lughadha. 2011. How many herbarium specimens are needed to detect threatened species? Biological Conservation 144(10): 2541-2547. doi:10.1016/j.biocon.2011.07.014

Snow, N. and P.L. Keating. 1999. Relevance of specimen citations to conservation. *Conservation Biology* 13(4): 943-944.

Suarez, A.V. and N.D. Tsutsui. The value of museum collections for research and society. *BioScience* 54(1): 66-74.

Taylor, D.W. 2014. Large inequalities in herbarium specimen density in the western United States. *Phytoneuron* 2014-53: 1-8.

Thiers, B.M. 2014. Biological collections are vital to preserving species in the face of climate change. The Huffington Post. Available at http://www.huffingtonpost.com/barbara-m-thiers/biological-collections-ar_b_5900590.html?utm_hp_ref=tw

Tripp, E.A. and K.E. Hoagland. 2013. Typifying an era in biology through synthesis of biodiversity information: Achievements and impediments. *Taxon* 62(5): 899-911.