

## Options for Managing Park Natural History Collecting and Collections: Case Study— Channel Islands National Park, Plant Collections

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The Santa Barbara Botanic Garden herbarium currently houses approximately 140,000 specimens, composed of 120,000 vascular plants, 20,000 lichens, and 1,000 mosses. Thirty-five thousand specimens are from the eight California Channel Islands, including about 23,000 from what is now Channel Islands National Park. The Channel Islands have been of considerable interest to botanists for over 120 years; their collections have been deposited at such institutions as the Smithsonian Institution, the California Academy of Sciences, the University of California at Berkeley, Rancho Santa Ana Botanic Garden, and the Santa Barbara Botanic Garden. The Santa Barbara Botanic Garden's Clifton Smith Herbarium is the primary depository for collections from Channel Islands National Park, enabled through a cooperative agreement with the park.

The nucleus of the garden's herbarium centers on the efforts of Ralph Hoffmann, who was director of the Santa Barbara Museum of Natural History in the 1930s. Hoffmann collected extensively on the northern Channel Islands from 1925 to 1932. His collections have been supplemented by the fieldwork of successive researchers, including Martin Piehl, Ralph N. Philbrick, E. R. (Jim) Blakley, and Steven Junak, the current curator. Consequently, a substantial portion of the collection was acquired prior to designation of the islands as a national park. However, these collections provide the foundation for analyzing and extending knowledge of the islands' plant diversity. Current collecting activities focus on new distributional records, especially to document rare species, invasive species, and new geographical or ecological records. All current collecting and curatorial efforts are conducted under a permit issued through a cooperative agreement between the park and the garden.

Herbarium specimens are essentially pressed plant materials, selected to represent diagnostic features of the plant that are useful for identification, systematic research, and other purposes, including even DNA extraction. Specimens are prepared using standard practices, including use of archival paper, glue, and storage cabinets (Metsger and Byers

1999; Lee et al. 1982). Pest management includes freezing specimens prior to storage in the herbarium cabinets and regular inspection of collections for potential pests. The herbarium collections are housed within a fireproof structure and have experienced a very low level of infestation from such pests as book lice and silverfish, resulting from regular inspections, prompt treatment of infected specimens, and a positive air pressure maintained by an air conditioning system. Relative humidity is maintained at less than 30% through use of a freestanding dehumidifier. Study of specimens is restricted to within the collection rooms, which minimizes exposure to potential pests.

The herbarium is actively used by professional botanists, students, researchers, and environmental consultants. Most use of the park-based collections is by garden staff, park staff, visiting researchers, and graduate students; additional use occurs in the form of requests from other institutions for loans. Loans are made under standard practices, which include only those institutions with appropriate herbarium facilities. Annotations are expected for all returning loans. We estimate that at least 400 publications, including scientific journal articles, books, and technical reports, have resulted wholly or partly from collections housed in the herbarium.

Published floras based on the collections include those for Santa Barbara Island (Philbrick 1972) and Santa Cruz Island (Junak et al. 1995). Some examples of recent scientific publications include descriptions of new species (Davis 1997; McCabe 1997) and reproductive biology (Barrett et al. 2000). The herbarium collections also include vouchers for technical reports on vegetation and rare plants, including Halvorson et al. (1992) and McEachern et al. (1997).

The garden has developed a database that currently holds 60,000 specimen-based records, of which about 40,000 records are from the Channel Islands. About 90% of the records are from the herbarium, the remainder having been obtained from other herbaria, including those of the California Academy of Sciences and the University of California at Berkeley. We estimate that a database on the California Channel Islands may approach 100,000 records, judging from conservative estimates of collections at other institutions. It is likely that as many as 40,000 records may ultimately become available for Channel Islands National Park. All of the botanic garden's island lichen collections, about 5,000, have been databased and are currently available through a web site hosted by Arizona State University ([seinet.asu.edu/collections/selection.jsp](http://seinet.asu.edu/collections/selection.jsp)). Until early this year, the garden's database on higher plants was accessible through the non-profit Calflora, which has now been temporarily suspended because of budget shortfalls. About 75% of the island collections have been databased, and we expect to complete the effort by the end of 2003.

The database uses Microsoft Access as a platform, primarily because it provides relatively easy exporting tools so that data can be shared with other agencies and institutions. The database structure essentially follows guidelines established by the International Union of Biological Sciences, Taxonomic Database Working Group ([www.tdwg.org](http://www.tdwg.org)). Thirty-seven fields are employed for entries on geographic locality, collector(s), date, and plant specimen data recorded by the collector, among others. Records can be sorted in different ways, depending on research or manage-

ment needs. Specimen-based records are gradually being georeferenced, using latitude and longitude in decimal degrees, which permits analysis output to a geographic information system (GIS) for mapping purposes. Data are generally provided in electronic format on request to qualified researchers. All data requests are reviewed and provided with appropriate stipulations that include giving credit to the source of information. Data have been provided to such agencies as the California Department of Fish and Game Natural History Database (Tibor 2001), USDA PLANTS, Calflora, the Biota of North America Project, and the National Park Service. Currently the Santa Barbara Museum of Natural History and the Santa Barbara Botanic Garden are pursuing development of an all-island, all-taxon database, which eventually will be available on the internet.

The garden and the park have enjoyed mutual benefits from a cooperative agreement that clearly defines responsibilities and expectations. Specimens and specimen data are available through several media, including loans of collections and data summarized by means of reports extracted from the database. The central location of specimens provides for appropriate curation and access, reducing demands on park staff and resources. The scientific community has clearly benefited through the availability of specimens for study and from database records used in various endeavors of analysis.

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