Study Guide for Prospective Certified Botanists

This study guide is designed to provide information and links to resources to help applicants prepare for the certification exams. This guide is not designed as the sole tool to use to prepare for the certification exams, as the exams are intended to test the knowledge of the professional that already has extensive experience in the botanical field.

The Board of Certification (BOC) uses three different tests to determine a botanist’s knowledge as a Field Botanist, plus one additional test for the Consulting Botanist. The Field Botanist is expected to know basic plant biology, botanical terminology, floristics, field survey and measurement methods, how to identify an unknown plant using dichotomous keys. In addition, the Field Biologist is expected to know common and characteristics plants of California by sight and the guidelines, rules, and regulations that apply to conducting field surveys. The Consulting Botanist exam covers additional topics such as environmental regulations, permitting requirements and processes, and how to document botanical resources and assess project-related impacts to those resources. Let’s face it, the Consulting Botanist must know just about everything, or at least something about many things related to the environmental consulting profession.

Other than providing answers to specific test questions, it is impossible to develop a study guide that is all encompassing; rather, this study guide will focus attention on specific areas and resources that should be helpful to the applicant in preparing for the exams, and know that many of the test questions are based on the resources identified in this study guide.
Field Botanist:

1. Plant Identification

A. You must be able to identify by sight at least 500 common/dominant plant species native or naturalized to California. A subset of these 100 taxa will be used to test your knowledge of the most commonly encountered plants of California through fresh plant material and/or photographs (that show key characteristics). No tools or references, other than your hand lens, will be provided or allowed to assist you with identifying these plants. You must know them by sight. One point is given for correct genus and another point for correct species names. There are some genera that are challenging to ID even for the very experienced botanist, so for those, you only need to identify them to the genus level. Those are indicated in red text on the list.

B. You must demonstrate that you can use dichotomous identification keys, such as included in the Jepson Manual and the Flora of North America North of Mexico, to accurately identify a plant specimen. Fresh plant material of five (5) native or naturalized plants will be provided to test your abilities to key out a specimen and obtain the plant’s correct identification. Tools necessary to observe the material will be provided if needed. A 10X hand lens and a metric ruler are all that will be needed for most of the plants. It is your responsibility to bring a hand lens and ruler. Bring your Jepson Manual to key out the plants. Dissecting microscopes will be provided, if deemed necessary to fully identify the specimen. You will also need to show your work by documenting the decisions you made during the keying process, such as listing the key characters of the plant on hand that made you decide which couplet you followed to identify the plant. Use the technical terminology to describe your plant, such as “leaves pinnately compound”. Partial credit will be given for an accurate description of the specimen even if you are not able to identify it correctly or fully. One point is awarded for the correct family, one point for the correct genus, and one point for correct species ID. Two points are available for an accurate technical description of the specimen.
2. Plant Terminology, Systematics, and Taxonomy
   A. You will be tested on technical terminology that is used to describe plants. The
terminology you are expected to know is available in most botanical term glossaries,
such as in the Jepson Manual. An example of a botanical term is: crenate. The test
question will provide possible definitions and you must select the answer that is correct.
B. You will be tested on taxonomic relationships of plants, family characteristics, and other
topics related to plant systematics. Questions will reflect the most current taxonomy as
indicated in the Jepson eflora.

3. Field Survey Methods and Protocols
   A. You will be expected to know how to perform a floristic field survey (how, when, and
why) and should be intimately familiar with the CNPS field survey guidelines, the
California Department of Fish and Wildlife plant survey protocols, U.S. Bureau of Land
Management plant survey protocols, and the U.S. Fish and Wildlife Service guidelines
for conducting botanical inventories. There will be at least 20 multiple choice or
true/false questions in the exam covering this topic.
B. You will be expected to know how to perform statistically valid field sampling, using
different methods for different purposes. Measuring and Monitoring Plant Populations
(Elzinga et al. 1998) is a helpful resource related to this topic.
C. You will be expected to know how and when to complete field survey forms for
submittal to the California Natural Diversity Database. You will be expected to know the
definitions of special-status species.
D. You will be expected to know how to access plant occurrences of special-status species
that may occur on a project site, by accessing online databases and assessing site
conditions for suitability for specific special-status species.
E. You will need to know what various tools are available to help identify plants that grow
in or near your study site, such as the CNDDB, Calflora, local floras, Consortium of
California Herbaria.
F. You will need to know how much time is expected as necessary to fairly and completely
survey a project site. (CDFW Survey Protocols)
G. You will need to be familiar with vegetation classification methods, including the
terminology and system used according to the Manual of California Vegetation, Second
Edition.
4. Site Characterization Methods
The conditions of a project site must be known before any sort of assessment can be performed. The field botanist needs to be able to fully describe and map the existing conditions of a project site. This includes documenting observations of all the plants, vascular and non-vascular, that occur onsite, as well as where any special-status species occur onsite or that may be affected by the proposed project. The plant communities that occur onsite must be fully documented. Voucher specimens should be collected to provide physical evidence of your observations. The tools you use to do this should be documented. When and where you surveyed must be provided.

5. Laws and Regulations Pertaining to Field Work
   A. You will be expected to be familiar with laws, regulations pertaining to plants and when and how you may collect/voucher them. Know the rules (guidelines) for collecting voucher specimens.
   B. You will be expected to know when and how to obtain permits to collect voucher specimens.

6. Reporting and Record Keeping
   A. You will be expected to know how to record and report your field surveys. Since a Field Botanist may not be the person preparing the report documenting the existing conditions, your notes and data from your field surveys are vital and necessary.

7. Ethics and Minimum Professional Standards
   A. You are expected to know all aspects and tenants of the Botanist Code of Ethics, specifically, the five ethical practice goals.
   B. You will need to know what the 21 standards of professional conduct identified in the Code of Ethics.
Consulting Botanist

1. Federal, State, and Local Laws & Regulations
   A. You are expected to have a basic understanding of federal, state, and local laws and regulations as they pertain to botanical resource assessments and permitting. This includes botany related components of the National Environmental Policy Act (NEPA), the federal Endangered Species Act (ESA), the Clean Water Act (CWA) Section 404, the California Environmental Quality Act (CEQA), the California Native Plant Protection Act (NPPA), the California Endangered Species Act (CESA), the California Fish and Game Code (CF&GC), the General Plan Law, the Oak Woodlands Conservation Act, and California Coastal Act. You will need to know how these laws and regulations relate to impact assessments and permitting requirements to the field of botany.
   B. You will need to know what mitigation measures will be required associated with one or more of the laws/regulations mentioned above for a proposed (development) project.
   C. Since CEQA is the primary impact assessment regulation for land use decisions in California, understanding what CEQA requires of the Consulting Botanist when conducting a site assessment, impact assessment, and recommending mitigation measures, a thorough understanding of those requirements and how the Consulting Botanist should perform their work is tested through at least 20 multiple choice and true/false or Yes/No questions. The Consulting Botanist needs to understand the CEQA review process, from beginning to end, and the specific terminology and requirements of CEQA. The Association of Environmental Professionals (AEP) publishes the updated CEQA Guidelines annually, which is available as a downloadable PDF online. AEP and other organizations and companies offer professional training workshops on CEQA, but they are broad in scope, covering all topics but do not provide much depth into biological resources. CNPS offers a 3-day workshop annually on CEQA for the biologist, which may be a good workshop for those preparing for the Consulting Botanist certification exam.

2. Reporting and Assessment of Impacts and Findings
   A. You will need to be able to demonstrate your knowledge about how to document the existing conditions of a project site.
   B. You will need to know how to determine both direct and indirect impacts a project may have on the botanical resources onsite and adjacent/downstream of the project site.
   C. You will need to demonstrate how to determine or establish significance thresholds.
   D. You will need be familiar with how a significant impact can be feasibly mitigated to less-than-significant levels.

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E. You will need to know the basic process that must be followed to comply with CEQA and NEPA.

F. You will need to know how to document or support your findings.

G. Since assessments need to be made objectively, you will need to be able to identify various tools that are available to assess habitat functions, and how those functions may be enhanced, impaired, or altered based on various project and/or mitigation scenarios.

3. Development and Implementation of Mitigation Measures

A. You will need to know how to develop a mitigation measure, and how it can or should be implemented.

B. You should be able to determine when mitigating a significant impact is not feasible.

C. You should know how to identify success criteria and thresholds for mitigation measures.

D. You should know how long monitoring implementation of a mitigation measure will need to be conducted.

E. Since development of mitigation measures requires a strong understanding of site conditions, you will need to have a good grasp of ecology, soils, geology, and hydrology.

References and Links to Online Resources


Botanist Code of Ethics

500 common/dominant plant species

Calflora

Consortium of California Herbaria

California Natural Diversity Database

CNPS field survey guidelines

California Department of Fish and Wildlife plant survey protocols

U.S. Bureau of Land Management plant survey protocols

U.S. Fish and Wildlife Service guidelines for conducting botanical inventories