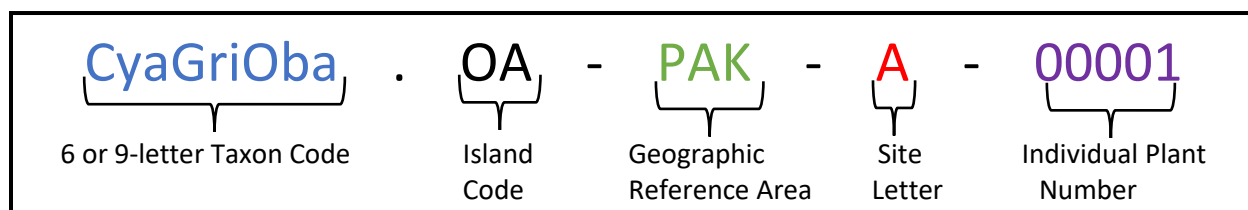




Naming Rare Plant Populations, Subpopulations, Sites, and Plants

HRPRG Reference Codes

Rare plant conservation (e.g., federally and state listed endangered and threatened species and species and populations managed by the Plant Extinction Prevention Program (PEPP)) requires careful tracking of plants and propagules. To maintain current data on population trends and which collections are held ex situ, each Site and sometimes each individual plant needs to be labeled and tracked using a unique identifier. HRPRG uses a standardized system based on location to assign a code to each Site, individual plant, or a group of plants at one site. Tagging logistics forthcoming in revise Collection and Handling BMP.



The example above shows the full HRPRG Reference Code for Cyanea grimesiana subsp. obatae, on Oahu (OA), at Puu Palikea (PAK), in Site A, plant number 1 (00001). The code is written on the tag and onto collections transferred to nurseries, seed banks and botanical gardens.

Taxon Code: The shorthand format for each taxon is the first three letters of the genus, species, and variety or subspecies. However, there are some duplicates when this is applied across the native and non-native flora. In those cases, the taxon code uses an extra letter for the species and subspecies or variety. A full list of the taxon codes for native plants is being developed.

Island Code: A two-letter shorthand for each island. A list of is available here (note USFWS uses 3 letter codes to account for all islands in the Pacific):

2 Letter Code	3 Letter Code	Island	Island Group
HA	HAW	Hawaii	Main Hawaiian Islands
MA	MAU	Maui	Main Hawaiian Islands
MO	MOL	Molokai	Main Hawaiian Islands
LA	LAN	Lanai	Main Hawaiian Islands
KH	KAH	Kahoolawe	Main Hawaiian Islands
OA	OAH	Oahu	Main Hawaiian Islands
KA	KAU	Kauai	Main Hawaiian Islands
NI	NII	Niihau	Main Hawaiian Islands
NH	NIH	Nihoa	Northwestern Hawaiian Islands
NE	NEK	Necker	Northwestern Hawaiian Islands
PH	PHR	Pearl and Hermes Reef	Northwestern Hawaiian Islands
LY	LAY	Laysan	Northwestern Hawaiian Islands
LI	LIS	Lisianski	Northwestern Hawaiian Islands
MI	MID	Midway Atoll	Northwestern Hawaiian Islands
KU	KUR	Kure Atoll	Northwestern Hawaiian Islands
FF	FFS	French Frigate Shoals	Northwestern Hawaiian Islands
GP	GAR	Gardner Pinnacles	Northwestern Hawaiian Islands
KL	KAL	Kaula Rock	Northwestern Hawaiian Islands
MR	MAR	Maro Reef	Northwestern Hawaiian Islands
LE	LEH	Lehua	Northwestern Hawaiian Islands



Geographic Reference Area (GRA): Three-letter code is used to identify an area on each island. These areas were drawn along ahupua'a boundaries and mostly follow natural topography. Some other codes were added for large single-landowner properties and some botanical gardens. The map of GRAs is here: [GRA Map](#); and a complete list of GRAs can be downloaded from that site. The term 'Population Reference Code' is no longer being used to avoid confusing these Sites or GRAs as biological populations, or subpopulation units (below).

Site Letter: A single (A), or double letter (AA) code is used to identify each site within each Geographic Reference Area. A different unique letter should be assigned to a group of plants that can be monitored in a single day. The lettering does not need to be alphabetical or systematically assigned across the GeoRef Area, only unique to each site. Manmade barriers, such as fences, and topographic barriers, such as waterfalls, ridgelines, or different aspects should be used to break apart large groups of plants into smaller sections, when needed. Large continuous groups of plants are broken into sections to avoid capturing incomplete monitoring data. These sites are not intended to represent biological populations. Instead, they are discrete groups of plants that can easily be described using features in the field, sketched on one map, and counted in one day, or flight, or monitoring event. The double letter code (XX) is reserved for unknown and miscellaneous sites.

Individual Plant Number: A unique five-digit (00001) number is permanently assigned to every newly tagged plant (or group of plants) in the field. These numbers do not need to be consecutive. Ideally next numbers for all sites would be determined ahead of visit, or accessible in the field. If that is not the case, and you are unsure of the next available number, skip far enough ahead (to 100), so it will not be a duplicate. Sketch maps should be used in case tags are lost.

- Separate individual perennial plants are assigned a unique number and tagged in the field
- Annual and monocarpic species (e.g. *Sanicula*), even though they will soon die, are also given a unique individual number. Tagging is not needed if the plants will not be revisited.
- Isolated inseparable clusters of multiple plants are also each assigned a unique individual number. Each cluster is tagged in the field with a note on how many is in each. Large clusters should be subdivided using permanent landmarks as much as possible so that collections maximize representation across the entire cluster (e.g. *Sicyos*, *Stenogyne*, *Ranunculus*). When new plants in the cluster are suspected, collections of the same number but across different collection dates should be withdrawn to maximize genetic diversity in conservation outplantings.
- Bulk collections of more than one untagged individual plant combined into a single bag are labeled "00000". Bulk collections from the same site but on different days would receive the same number, "00000", and be distinguished by the collection date. The total number of plants is written in the notes and a map made to show the sampled area. These collections are appropriate for sites where re-visits are unlikely, or for research collections or other situations where representation of the site is not imperative.

Founder vs. Source






Restoration efforts with rare plants track individual plants carefully so they can be represented in *ex situ* collections and genetically balanced outplantings. Plants from small fragmented populations may need to outcross with other plants to enhance fitness lost from population declines. Tracking their lineage can



return important information about why certain plants are successful in some sites but not others. To do this, it is important to know both the **FOUNDER** and **SOURCE** of your plants.

Each “FOUNDER” will be accounted for and have its lineage tracked throughout restoration work using its HRPRG Reference Code. Founders are usually individual naturally occurring genetically unique wild plants. In some cases, only first-filial (F1), or material even further removed from the original wild source is available to serve as a FOUNDER. A FOUNDER will represent a unique lineage to be represented, balanced, and tracked in future restoration efforts. Once a propagule is removed from a founder plant (usually by collecting seeds or vegetative propagules) and transferred to a nursery or garden, the resulting stock changes a bit from being in cultivation. Subsequent collections from cultivated stock come from the same lineage as the original FOUNDER but are now from a new “SOURCE”.

When propagules are transferred to a nursery, seed bank, botanical garden, or Lyon Micropropagation Lab, they are given a unique accession number. This number becomes the new SOURCE code. Each facility has its own unique format and the collection information you submit (especially the HRPRG Reference Code) with the collection is transferred to the record for that accession. When you withdraw seeds from a seed bank and transfer them to a nursery, the nursery will transfer the FOUNDER code and then use the seed bank’s accession number as the SOURCE. Each time the collection is cultivated or kept in storage, or outplanted, it is given a new SOURCE code. Tracing these codes will tell the whole story about where a seed came from and perhaps important clues about why it is doing well. This could help explain why the seedlings appear to be hybrids or are the result of self-pollination in cultivation.

	FOUNDER CyaGriOba.OA-PAK-A-0001	In this example, a seed collection of <i>Cyanea grimesiana</i> subsp. <i>obatae</i> was made from the original wild founder: CyaGriOba.OA-PAK-A-0001.
	SOURCE 1: Seed Bank Accession #: 201705230001-0001	The seed collection was then transferred to a Seed Bank and assigned a unique Accession #: LA201705230001-0001.
	SOURCE 2: Nursery Accession #: 9786	The seeds were then withdrawn and transferred to a nursery and given another Accession #: 9786
	SOURCE 3: Botanic Garden CyaGriOba.OA-WBG-A-0001	These were planted as a Botanic Garden Conservation Collection with source code: OA-WBG-A-0001
	SOURCE 4: Outplanting CyaGriOba.OA-PAK-B-0073	Finally, the plants were outplanted and one was given a new HRPRG Reference Code: CyaGriOba.OA-PAK-B-0073. Collections from this plant will hold the entire history.

Subpopulation Units (synonyms: Population Unit, Subpopulation)

Information about the status of a rare plant taxon and progress towards goals for its recovery are discussed and measured using the number of individual plants and the number of populations. As discussed above, a Site delineates a group of plants that can be visited in a single day and is not meant to represent a biological population. A true population may have just one or many Sites and can span several Geographic Reference Areas or be contained within one GRA. However, the term “population” is difficult to define for Hawaiian plants, especially when current distributions reflect years of extirpation, fragmentation, and habitat destruction by invasive species. We typically do not have the data to determine classical biological definitions, such as “a self-reproducing group of conspecific individuals that occupies a definite area over a span of evolutionary time, possesses an assemblage of genes (the



gene pool) of its own, and has its own ecological niche”. Also, sometimes there can be confusion on whether the term “population” is used to refer to the total population size of a species.

The International Union for the Conservation of Nature (IUCN) Red Listing Authority has defined the term “population” to refer to the entire distribution of a taxon; and “subpopulations” to describe groups of plants. “Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less). For example, a subpopulation can be defined as a spatially distinct segment of the population that experiences insignificant seed or pollen migration from other subpopulations within a generation. Although subpopulations typically have little demographic or genetic exchange, this may or may not amount to their complete isolation in this regard. In other words, subpopulations need not be completely isolated.” (IUCN 2014)

The Hawaii and Pacific Plant Recovery Coordinating Committee (HPPRCC; Plant Recovery Team) has acknowledged the difficulty in identifying true biological populations:

“A number of Hawaiian taxa are no longer viable as populations or are artificially distributed as scattered individuals and may be reproductively limited. Hawaiian populations can be defined by shared ecology or specifically ecological risk, such that a single event (*e.g.*, ungulate browsing, landslide, or fire) can extirpate a single population and one major climatic event, such as a hurricane, may affect local habitat.”

In other words, It can be difficult to determine whether the scattered individual plants we know of now were once part of a large continuous population. In order to create a systematic method based on limited data to group taxa for conservation and recovery purposes, a working definition of population that has been implemented for Hawaiian plants by HPPRCC as:

“A group of conspecific individuals that are in close spatial proximity to each other (i.e., less than 1,000 meters apart or less if other factors, such as barriers to dispersal or gene flow, are also present), and are presumed to be genetically similar and naturally capable of sexual (recombinant) reproduction.”

In Hawai‘i, this working definition has sometimes been referred to as Population Units. We recommend using this working definition to equate Population Units and Subpopulations and to therefore consistently evaluate groupings of taxon similarly for both recovery, red listing, and HPPRG purposes. Therefore, HPPRG adopts the term ‘subpopulation units’ for this working definition. As more is learned about each species through genetic studies, the true effects of natural barriers or discontinuities in native habitat, or discovery of new plants, the terms and methodology may need to be re-delineated. A list of subpopulation units for each taxon is maintained by DOFAW, FWS, PEPP and other permitted species managers.

References

IUCN Standards and Petitions Subcommittee. 2014. Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee. Downloadable from <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.