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RE-VEGETATION MONITORING
CABRILLO NATIONAL MONUMENT

MONITORING PROTOCOL

This vegetation monitoring protocol is chiefly designed to monitor changes in terrestrial vegetation brought about by resource management efforts in the Point Loma Ecological Reserve.

It has been designed with the assistance of Dr. Tim Graham, Ecologist, USGS Biological Resources Division, Moab, Utah, Jane Rodgers, Natural Resource Specialist, JOTR, Tim Coonan, Terrestrial Ecologist, CHIS, and Dr. Kathryn McEachern, USGS Biological Resources Division, CHIS. Monitoring is conducted in two ways. Permanent transects will quantitatively document changes in the vegetation (species composition, cover, height, etc.). Each of these transects will have slide photographs taken from each end to augment the transect data. Revegetation demonstration photo plots will be established to qualitatively document the broader changes to the habitat. Sampling will be conducted each spring and fall.

SAMPLING METHODS

I Permanent Transects

Five transects will be permanently established in each revegetation site (patch) sampled. The band transect method will be utilized to sample each of these transects, similar to the method employed by CHIS for re-vegetation monitoring. Transects will be 10 m long, with .25 square meter quadrats (.5 m by .5 m) at every half meter (20 quadrats/transect). Each site will total 100 quadrats of data (20 quadrats/transect x 5 transects). This method records species and their percent cover in the quadrat, by classes (0-25, 26-50, 51-75, 76-100). This technique is more appropriate for our vegetation than counting individuals (as in CHIS re-veg) because a dominant exotic is *Carpobrotus* spp., for which determining numbers of individuals is not feasible. Each species (new plants at sites already reveged) is divided up according to whether it was planted from seed, planted as seedlings raised at the park, planted from nursery stock, or volunteers. Ecological attributes that can be quantified from this method include species composition (e.g., # exotic vs. # native species), species richness (# of species), and cover, in addition to revegetation technique successes.

Site selection

The transects are best set up running across the width of the re-vegetation site vs. along the length of it (Dr. Graham, pers. comm., 4/97). Randomly selection of sites is critical, a standard, and quite easy.

Assign a number to each meter along the length of the long edge. If the length is very long (e.g. half mile) assign numbers to each 10 or 100 m length, whatever works. Then put those numbers (e.g. 1-25) in a container and blindly draw out five numbers. Those

numbers correspond to where along the length of the transect to begin. Then you need to randomly determine how deep into the patch you begin your transect. If the site is very narrow (close to 10 m), you may just face away from the patch and throw a readily visible object over your shoulder and start the transect where it lands. If the site is much deeper than 10 meters, you can again estimate the depth of the site at that point in meters, subtract 10 to allow room for the transect at the edge of the patch, and place those numbers (e.g. 1-30 for 40 m length) in a container and pick one. That is how far into the patch you place your first re-bar. Number the re-bar with the transect number using either a metal tag, or permanent ink on flagging. Then measure 10 m further into the patch and place your second re-bar there (the endpoint). Sketch the site on the "Revegetation Site Description" sheet, noting the beginning end of the transect (1st rebar) and fill in all the data (e.g.s, compass bearing, map quad number).

Sampling Procedures

Take data sheets, quadrat, and tape measure to each transect location. Determine which end of the transect is the starting point from the site description sheet and then stretch the tape out accordingly. After the tape is down, the person who will identify species (reporter) takes the quadrat and places it between 0 and .5m, adjacent to the rebar. While the helper records data, the species reporter calls out each species within the quadrat and their cover class, separating it by whether it was planted by seed, planted as a seedling raised at the park, planted from nursery stock, or was a volunteer. If there is no vegetation in areas within the quadrat, the reporter identifies the unvegetated substrate (bare soil, rock, or litter) and it's cover class for that quadrat. When every species in the quadrat is called out and recorded, then the overall cover class for exotic and native species on the quadrat is recorded. Overlapping areas are not double counted. If two native species each cover 30 percent of the quadrat (cover class 2, 26-50%), with 20 of the cover overlapping, the total cover is 40 percent (30 of one, plus the additional 10 of the other that does not overlap), and the cover class is 2 (26-50% cover). The quadrat is then moved up the meter tape for the next .5m section (.5m-1m) and that quadrat is read. Continue this process until the entire transect is read. Next take the photos.

Transect photo plots

Slide photo graphs will be taken from both ends of each transect, with the meter tape stretched from re-bar to re-bar, and the photographer's assistant holding up a sign at the far end showing the transect number and the date. The purpose of these photo plots is to augment the data collected from the transect. Fill in the data in the "Revegetation Transect Photo Log." Make notes concerning any outstanding or unusual circumstance involving the transect (e.g. missing end stake) or that part of the Point Loma Ecological Reserve. Move on to the next transect.

Personnel

Two people are needed for each transect. One must be able to recognize species and identify plants down to species, and know whether they are native or exotic. Someone also needs to be able to operate the camera, re-load film, etc. It is best if both persons are familiar with plant species and camera operations.

Sampling Equipment and Materials

In addition to this protocol, the following equipment and supplies are needed. Equipment just for site selection has an S by it, and that just for Quadrat reading (sampling) has a Q by it. The rest are for both.

Data forms

Pencils

Permanent ink pens (Sharpe)

Clipboard

Maps

Compass

150-m measuring tape

First Aid kit

Radio

Notebook

Personal Gear

Hiking boots

Day pack

Sun glasses, hat or cap, sunscreen

Binoculars

Water bottle

Food and drink

Q Species lists, Field guides as desired (Munz, Dale, Jepson)

Q 25-cm (1") diameter PVC pipe quadrat (.5m x .5m)

Q Camera

Q Slide film

S Rebar

S Flagging, or numbered metal tags

S Numbered pieces of paper, envelopes

II Revegetation demonstration photo plots

Permanent revegetation demonstration photo plots will be established at revegetation sites to document changes brought on to the whole site, vs. just at a transect. The goal of these photographs is to visually document the qualitative changes in the vegetation over time, so the number and location of these photoplots will vary with the nature and size of the revegetation site.

Site selection

This selection is NOT random. Very small reveg sites may only need one well placed photograph to characterize the vegetation, whereas large sites will require more. This will have to be determined in the field. Occasionally distant shots are useful to place the revegetation project in context, and will include the surrounding area, e.g. native vegetation surrounding the disturbed area. Generally, however, the closest you can get while still encompassing the area, is best.

Once a suitable photoplot has been selected, the position from which it is taken is marked by re-bar. Re-bars are numbered (each is unique, and in sequence) and marked by either permanent ink on flagging tied to the re-bar, or numbered, metal tags. Information describing these photo plots are recorded on two sheets to facilitate re-locating re-bars and replicating the photographs accurately. These sheets are the Revegetation Monitoring Site Description; Revegetation Demonstration Photo Log.

On the Revegetation Site Description sheet sketch the site and location of the numbered re-bars, in addition to filling in all the data blanks. Map quad numbers can be found on accompanying maps in the Revegetation Monitoring folder, demarcated by 500 ft. by 500 ft. grids overlaying the Point Loma Ecological Reserve and road map, and is available on the park GIS. On the back of the data sheet, landmarks in the photographer's field of view are noted to help replicate the shot as closely as possible from year to year (e.g. light house tower in extreme upper right hand corner). Landmarks need to be permanent structures, including buildings, roads, geologic formations, etc.

Sampling Procedure

Locate the site rebars using the Revegetation Site Description sheet and the map quad number. Once you have found one, confirm the rebar number, look up the compass bearing you should be facing, the notes describing landmarks for the photo, and shoot it, filling the Revegetation Demonstration Photo Log. Note anything unusual about the site (missing rebar, etc.).

Personnel

Two people are needed for each transect. One must be able to use the camera, a compass, read maps, and change film. The other person serves as helper and data recorder.

Sampling Equipment and Materials

In addition to this protocol, the following equipment and supplies are needed. Equipment just for site selection has an S by it, and that just for photographing the plots has a P by it. The rest are for both.

Data forms

Pencils

Clipboard

Maps

Compass

150-m measuring tapes

Camera

Slide film

First Aid kit

Radio

Notebook

Personal Gear

 Hiking boots

 Day pack

 Wind gear

 Sun glasses, hat or cap, sunscreen

 Binoculars

 Water bottle

 Food and drink

S Rebar

S Flagging, or numbered metal tags

P Photos of the sites from previous years