

SmartScape Design Provides Improved Avian Habitat

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INTRODUCTION

Conventional landscaping primarily consists of monoculture non-native grasses as cover, and large trees and /or shrubs as focus, or highlight plants. While these classic, simplistic landscapes are aesthetically pleasing, they provide little vegetation variation and complexity to attract and support native wildlife, primarily birds (Roth, R., 1976). Not only do these standard landscapes lack the variability to offer adequate year-round resources for birds, such as food and shelter, they are extremely high maintenance in regards to irrigation, electricity and labor needs (Stivers & Associates, 2010). Many plants in conventional landscapes are ornamental plants not native to the area, and so an artificial environment must be created in order for the plants to get the type of soil nutrients and water they need to thrive. This creates a demand for irrigation and fertilizers, and consequently, a demand for associated labor and electricity. Financial costs increase, as well as detrimental effects on the natural environment. Native vegetation is suppressed by these forced landscapes, leaving the resident wildlife denied of its natural ecosystem (Hostetler, M.E., and Main, M.B., 2010).

In an effort to design a more natural landscape and decrease the water, electricity and costs associated with conventional landscapes, SmartScape was created by Orange County Coastkeeper and Southern California Edison (SCE) to develop SCE's Villa Park (VP) Substation in the City of Orange. SmartScape will also serve as a model for a sustainable landscape that can be utilized to retrofit both residential and business areas. By planting native Southern Californian and other Mediterranean vegetation that is already naturally drought-resistant, irrigation needs are lessened dramatically. It is also hoped that by increasing the native vegetation, more avian species will return to utilize the area for resources (Burghardt, K.T., Tallamy, D.W., and Shriver, G.W., 2009). This native vegetation is a diverse mix of evergreen and flowering trees, shrubs, succulents and grasses, offering birds a wide range of textures and

vertical variation for shelter and nesting opportunities. Additionally, varied food resources are provided, such as nectar, seeds, and the insects that will be attracted.

The objectives of this paper are to (1) compare a base site with the SmartScape site for avian species diversity and abundance: (2) and to identify opportunities for avian habitat improvement for SmartScape.

BACKGROUND

Villa Park Substation

Originally designed as a conventional landscape in 1973, this approximately three-acre area on the corner of Taft Avenue and Tustin Street surrounding SCE's VP substation was planted with 272 trees and large areas of non-native kikuyu grass. By the time this area was surveyed prior to the SmartScape restoration, only 65 trees remained, all in decline, either dead or dying from disease or structural defects.

In 2010, the SmartScape design was implemented and finally unveiled to the public. The dying trees and turf grass had been removed, and the "California-friendly" vegetation planted. On-site composting and vermiculture will provide rich, naturally enhanced soils. Systems of bio-swales, detention basins, and percolation trenches are in place to enhance irrigation and help eliminate dry weather runoff. The project was completed in April of 2011 and is now on a two-year management and monitoring program.

METHODOLOGY

Base Site Description

A quarter of a mile east of the SmartScape landscape site on Taft Avenue is an SCE easement, which will serve as a comparison site. Since this area is an unimproved site, it represents what the SmartScape area looked like before the restoration.

Methods

Both sites were observed several times during the spring of 2012. With the use of binoculars, detailed observations were taken on avian species sighted, how many, and what (if any) resources at the site were being utilized. Each site was also described by its existing vegetation and location.

OBSERVATIONS AND RESULTS

BASE SITE

Vegetation and Site Description

The Base Site, while usually requiring irrigation to keep the grass green, appears to have gone fallow. The turf grass covering the easement is dried out and largely dead. The area is completely flat and there are no other plants growing on the main portion of the site. The southern border of the site connects to a residential development. The western and eastern borders are fenced off from concrete areas. The northern border, which runs along Taft Avenue, is a sidewalk, lined with planted ornamental trees, shrubs, and grasses. *Photinia* and Indian Hawthorne bushes are both non-native, popular ornamentals originating from Asia. They are widely cultivated and grown for their showy flowers. Along with Crape Myrtles trees, originating from China, these are the dominant tall plant forms along the northern border. *Gazania* is the primary ground cover plant, native to South Africa.

The northern side of Taft Avenue is a residential neighborhood. Traffic on Taft Avenue is light and relatively quiet due to it being more residential, less busy than on Tustin Street.

Avian Life

A pair of Mourning Doves was observed foraging on the western portion of the easement, on the pavement. An individual Anna's Hummingbird was observed perched and singing on the Crape Myrtle trees, as well as on the power lines above the trees, several separate times. A Red-tailed Hawk was observed perched for several minutes on the top of the tower on the eastern end of the easement. Several House Finches were observed foraging in the shrubs along the sidewalk and flying over the area. Many Tree Swallows were observed flying over the main area of the easement above the fallow grass. It appeared that the swallows were feeding on insects in the grass. There were no other bird species observed using this site for resources.

SMARTSCAPE SITE

Vegetation and Site Description

The SmartScape site, located on the corner of Tustin Street and Taft Avenue, is visually much more heterogeneous plant-wise, than the Base Site. Instead of a monoculture turf grass

for cover, there is a variety of native grasses, such as *Muhlenbergia rigens*, or deer grass, and wild ryes, rushes and sedges. These grasses were planted as cover and also in the drainage areas to help slow and filter excess rainwater. Many native, drought-resistant evergreen shrubs such as toyon (*Heteromeles arbutifolia*) and lemonade berry (*Rhus integrifolia*), as well as the Mediterranean rosemary (*Rosmarinus officinalis*), serve as mid and foreground plants. Lemonade berry (*Rhus integrifolia*), California buckwheat (*Erigonum fasciculatum*), Manzanita (*Arctostaphylos* species) and coffee berry (*Rhamnus californica*) are other native shrubs. Native trees have also been planted including Western Redbud (*Cercis occidentalis*) and Hollyleaf Cherry (*Prunus ilicifolia* spp. *ilicifolia*). “California-friendly” accent plants have also been added to bring focus to southern California’s distinctive vegetation and diversity. These include succulents like aloe and agave, and colorful, flowering plants like bird-of-paradise.

Both Tustin Street and Taft Avenue that surround this location on the west and north borders are busy with regular auto and pedestrian traffic, busier and noisier than the base site. The neighborhood is primarily businesses.

Avian Life

An individual Red-tailed Hawk was observed perched on a tower within the substation for several minutes. Several Bushtits were observed feeding on the purple sage (*Salvia*), which offers seeds and nectar through its flowers. A Black Phoebe was observed for several minutes feeding on the insects attracted to the purple sage in the same area. An Anna’s Hummingbird was observed foraging around the site often, visiting the red flowers of the dwarf bottlebrush (*Callistemon citrinus*) for nectar. Common Ravens were observed regularly in and around the substation and towers, a popular visitor to urban and rural areas for scavenging. Lesser Goldfinches were observed several times along Taft Avenue and Tustin Street, perched on the power lines and singing. A pair of Mourning Doves was observed for several minutes within the substation, resting together on the constructs. House Finches and House Sparrows were also observed many times foraging in the site. Tree Swallows were also observed flying over the site, foraging on the insects attracted to the plants.

Species	Base Site	SmartScape Site
Mourning Dove	X	X
Anna's Hummingbird	X	X
Red-tailed Hawk	X	X
House Finch	X	X
Tree Swallow	X	X
Bushtit		X
Black Phoebe		X
Common Raven		X
Lesser Goldfinch		X
House Sparrow		X
TOTAL (n)	5	10

DISCUSSION

While all of the ornamental, non-native plants in the Base Site easement are relatively drought-tolerant (excluding the turf grass cover), thus may requiring less irrigation, none are native to California. In a study by Burghardt, Tallamy, and Shriver (2009), landscape properties that were planted entirely with native plants supported higher avian diversity, abundance, and species richness, as well as supporting more caterpillars and caterpillar species, as opposed to traditional landscaped properties with non-native groundcover and shrubs. This study suggests that native landscaping can help to offset biodiversity losses in urban settings, in addition to saving water and electricity (Stivers & Associates, 2010).

Avian diversity and species richness was greater at the SmartScape Villa Park substation than the Base Site. Both sites had five species in common, suggesting that those species are common visitors to the greater area, probably year-round residents, and visit both sites regularly since they are in close proximity. The additional five species that were observed in the VP substation were largely observed utilizing the resources provided from the SmartScape

retrofit, like the purple sage, for example. Indirect benefits, such as the native flowering plants attracting insects, will then attract flycatchers like the native Black Phoebe.

RECOMMENDATIONS FOR SMARTSCAPE LANDSCAPING

Trees not only complete the canopy and increase aesthetic value, they provide an important shelter resource for birds to use for nesting, roosting and protection. Trees also intercept more rain water and can increase the amount of available moisture for plants and wildlife to utilize, in addition to slowing down surface runoff. Over time, the native trees and shrubs planted at the Villa Park substation will grow larger, but will not create a great enough canopy to interfere with the overhead power lines or impede the integrity of the security walls. Therefore, more native trees and shrubs that can grow densely and to a safe maximum height for the area are recommended for additional planting, either at the Villa Park substation or at future SmartScape sites. This will increase the safe spaces available to attract native bird populations.

Although noise levels were not studied on this project, noise from traffic, businesses, and pedestrians was observed to be consistently greater at the VP Site compared to the Base Site. Increased noise in avian habitat can mask alarm calls to other birds, predatory sounds, and mating calls and songs. Many recent studies have shown that urban noise has a negative effect on avian life (Slabbekoorn, H. and Ripmeester, E. A. P., 2008; Fernández-Juricic, E., Poston, R., De Collibus, K., Morgan, T., Bastain, B., Martin, C., Jones, K., and Treminio, R., 2005). In the study by Fernandez-Juricis, et. al, 2005, native male House Finch songs were found to be different in many different parks based on different factors including habitat structure and ambient noise. One result was that male House Finches decreased the number of notes in their songs as ambient noise increased. This could be detrimental for successful breeding since females prefer males with long songs (Nolan and Hill, 2004). In order to attract and support successful native avian populations, an attempt to decrease the noise created by urbanization needs to be addressed in future projects. Planting larger, denser vegetation when possible will help, but further research into other possibilities is necessary.

SUMMARY

SmartScape's native landscaping design is well on its way to success in many ways. It already is incredibly beneficial to the environment by reducing storm water runoff and preventing excess pollution. Traditional fertilizers and chemicals are not used, since vegetation is native and already suited to and comfortable in the climate. Also, composting and vermiculture on site creates rich, nutritious soils and reduces waste.

SmartScape is still, if not a more, beautiful design than conventional landscape, since it implements complex and colorful native plants. It is clear from this study that even in the early stages of this SmartScape retrofit, it is already attracting greater avian diversity. As the plants and trees develop over the years and become more established, more resources for birds will be available and will hopefully be able to sustain diverse and abundant avian populations.

LITERATURE CITED

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