



**SF Environment**

**Our home. Our city. Our planet.**

A Department of the City and County of San Francisco



Deborah Raphael  
Director

# Urban Greening Areas and Biodiversity



*Crissy Field*

*Study and Report by Anne Barbillon, Biodiversity Intern, October 2013 - February 2014*

*(Edited by Walter Millin, September 2014; Reviewed and edited only for accuracy and currency by Peter Brastow and Audrey Genest, June 2018)*

Department of the Environment, City and County of San Francisco

1455 Market Street, 12<sup>th</sup> Floor, San Francisco, CA 94103

Telephone: (415) 355-3700

Email: [environment@sfgov.org](mailto:environment@sfgov.org) • Website: [www.sfenvironment.org/](http://www.sfenvironment.org/)  Printed on 100% post-consumer recycled paper.

# Table of Contents

Introduction.....	3
Process/Overview.....	4
<i>I. Urban Greening Areas in San Francisco.....</i>	<i>5</i>
<i>II. Biodiversity in Urban Greening Areas.....</i>	<i>11</i>
1. Selection of Sample Areas.....	11
2. Questions Asked During Interview.....	12
3. Results by Typology with Examples.....	13
A. Urban Farms.....	13
B. Community Gardens.....	16
C. School Garden.....	18
D. Green Roofs.....	21
E. Vertical Gardens/Green Walls.....	24
F. Small & Medium Parks.....	26
G. Median Strips.....	27
H. Street Parks.....	28
I. Public Campuses.....	29
J. Green Corridors.....	30
<i>III. Discussion, Recommendations, and Resources.....</i>	<i>32</i>
1. Discussion of Visited Urban Greening Areas.....	32
2. Biodiversity Ratings.....	33
3. Recommendations.....	34
4. Resources.....	36

## Purpose of the Study:

*This study is meant to illustrate the presence of nature in San Francisco's urban environment and demonstrate its contribution to the conservation and enhancement of the city's biodiversity.*

## Introduction

Despite the ever-growing urbanization of San Francisco, it remains an important contributor to California's status as a global biodiversity hotspot, recognized by authorities such as *Conservation International* and *The Nature Conservancy*. San Francisco harbors a remarkable diversity of native plants and animals, including 10 federally-listed endangered animal species, 20 globally rare plant species, and hundreds of resident and migratory bird species. These populations can remain viable thanks to the rich quality of many natural habitat communities in the area such as coastal scrub, sand dunes, grasslands, oak woodlands, riparian corridors, and wetlands.

Humans have also created habitats in the built environment such as urban farms, street parks, green roofs, personal gardens, and many others which can all promote biodiversity.

Protecting and enhancing biodiversity in cities is an imperative, and green spaces in urban areas provide numerous environmental and community benefits. They can help to reduce flooding and sewer overflow by absorbing large amounts of stormwater, provide wildlife habitat, help to maintain air quality, reduce urban heat islands, and provide green space for neighborhood socializing and community building. This concept of protecting and reviving wildlife in the city is a way to educate people and raise awareness in the community about preservation of the natural world, which is fundamental for the future of our cities and our planet.



## Process/Overview

We inventoried all the different types of urban greening areas in San Francisco that we think can promote biodiversity and then investigated samples of each.

- I. The first section of this report defines what we call “*Urban Greening Areas*” and establishes a list of all the urban greening typologies that exist today in San Francisco.
- II. The second section presents the specific samples of visited sites and discusses how they each promote biodiversity in the city.
- III. The third and final section provides a discussion of findings, offers some recommendations in order to encourage good practices and further advance citizens’ knowledge of biodiversity and nature in the city, and includes a list of resources used throughout the study.





*Community Garden, Candlestick Point*

# I. Urban Greening Areas in San Francisco

An *urban greening area* is any kind of vegetated space in the city’s urban environment. This concept excludes the famous parks such as Golden Gate Park, Presidio, Twin Peaks, Glen Canyon Park, or McLaren Park because they are large enough to be considered as independent and whole natural environments of their own.

Below is a list of the different types of urban greening areas that can be found in San Francisco. This list tries to be as comprehensive as possible but is not exhaustive, and so other urban greening areas may be appropriate to inventory.

Urban Greening Area Type	Description	Programs & Policy Context
<p style="text-align: center;">Urban Farms</p>  <p style="text-align: center;">Little City Gardens</p>	<p><i>Urban farms</i> are places where people gather and work together to cultivate organic food in order to feed people in the city.</p> <ul style="list-style-type: none"> <li>- Educate local residents about how they can become food producers.</li> <li>- Increase ecological knowledge.</li> <li>- Improve habitat value.</li> </ul>	<p>The 2011 Urban Agriculture Ordinance allows for food production for personal use. In 2014, the Board of Supervisors established the City’s Urban Agriculture Incentive Zones.</p>
<p style="text-align: center;">Community Gardens</p>  <p style="text-align: center;">White Crane Community Garden</p>	<p><i>Community gardens</i> are pieces of land divided into individual plots that can be rented and cultivated by any resident of San Francisco.</p>	<p><i>Community gardens</i> are generally situated on City-owned properties.</p> <p>Today, <i>San Francisco Recreation and Parks Department</i> supports and manages a program of 38 community gardens.</p>

### School Gardens



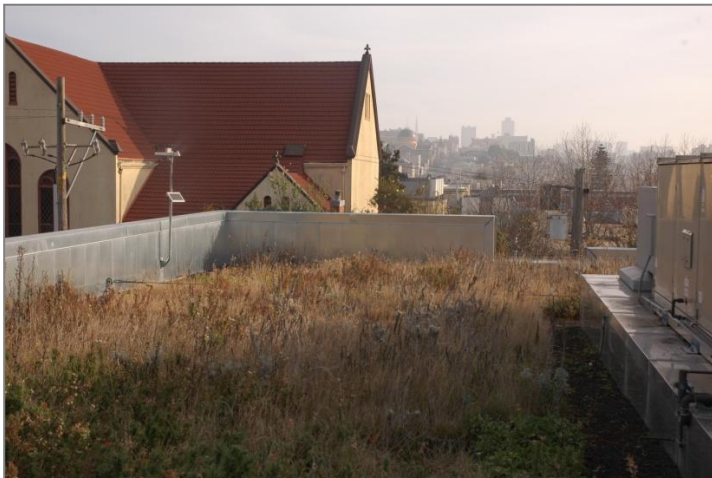
*Sanchez Elementary School Garden*

*School gardens* are gardens installed into schoolyards in an effort to educate students about nature, biological sciences, environmental sustainability, and gardening.

*Education Outside* is a San Francisco-based nonprofit that works to transform urban public schools by promoting green schoolyards and bringing learning to life in outdoor classrooms.

For the 2017-18 school year, the *Corps for Education Outside* served 47 public elementary and K-8 schools in San Francisco.

### Green Roofs



*Drew School's Green Roof*

A *green roof* is a roof that is partially or completely covered with vegetation and planted over a waterproofing membrane.

Effective on January 1, 2017, the *Better Roofs Ordinance* mandates living or solar roofs on most new construction.

### Vertical Gardens/Green Walls



*Drew School's Vertical Garden*

A *green wall* is a wall partially or completely covered with vegetation.

Many private specialized enterprises install vertical gardens on building walls.

Small Park & Medium Parks



*Alta Plaza Park*

Parks that are too small to be considered a full natural environment or habitat on their own.

SF Recreation Parks manages over 220 sites throughout San Francisco, including many small, neighborhood and "mini-parks".

Backyard Gardens

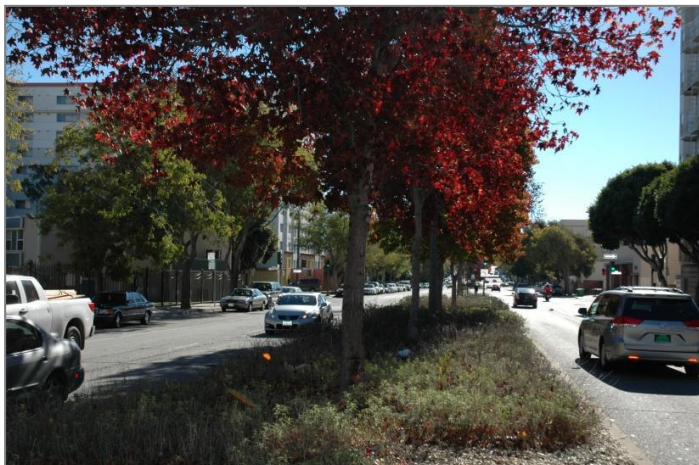


*Outer Sunset Garden*

*Backyard gardens* are any gardens located in the backyards of residential houses.

The San Francisco Planning Code has ratio requirements for usable open space in residential zones.

Median Strip



*Webster Street's Median Strip*

*Median strips* are areas made to separate two ways of a road. They are often raised from the road in order to create a real and defined space between the two ways.

San Francisco Public Works maintains the median strips in San Francisco.

## Paper Street



*Paper Streets* are streets that are mapped but never became streets for cars.

Many of them are cared for by neighbors and transformed into small gardens or pocket parks.

## Adah's Stairway

### Sidewalk Garden



*Sidewalk gardens* are areas on the street where the concrete sidewalks are removed and replaced by soil and vegetation.

The natural processes of the soil and plants help slow down and clean stormwater and keep it out of San Francisco's sewer system.

*The San Francisco Public Utilities Commission, Friends of the Urban Forest, and the residents of San Francisco have partnered on the Sidewalk Garden Project.*



<p style="text-align: center;"><i>Street Park</i></p>  <p style="text-align: center;"><i>Progress Park</i></p>	<p><i>Street parks</i> are community managed gardens on public rights of way owned by SF Public Works. The <i>Street Parks</i> program transforms public vacant lots such as unaccepted streets, sidewalks, medians, stairways, rows, circles, and triangles into gardens.</p>	<p><i>Street Parks</i> is a partnership between SF Public Works, the San Francisco Parks Alliance and the residents of San Francisco.</p>
<p style="text-align: center;">University/Business/Public Campus</p>  <p style="text-align: center;"><i>Laguna Honda Hospital</i></p>	<p><i>Public campus gardens</i> are lands owned and maintained by universities, businesses, or public institutions.</p>	<p>The SFPUC has a Large Landscapes Program that can provide assistance and funding to implementation of sustainable landscapes on campuses.</p>

## Stormwater Best Management Practices (BMP) Urban Greening Areas

The SFPUC (San Francisco Public Utility Commission) has created *Stormwater Best Management Practices (BMPs)*, also known as “*Stormwater Controls*” or “*Stormwater Management Facilities*”, to provide stormwater pollutant removal and peak flow/runoff reduction. Most of these BMPs also enhance urban habitat in the city and, therefore, are considered as urban greening areas.

Listed below are the different types of *(BMP) Urban Greening Areas* in SF and a brief description of each:



**Infiltration Basin** - An infiltration basin is a shallow impoundment over permeable soil which captures stormwater, stores it, and allows it to infiltrate. Its vegetation helps reduce the risk of clogging, increases the infiltration capacity, and impedes soil erosion and scouring of the basin floor.



**Detention Pond** - Detention ponds are temporary holding areas for stormwater that store peak flows and slowly release them, which lessens the demand on treatment facilities during storm events and prevents flooding.



**Wet Pond** - Wet ponds are constructed basins that have a permanent pool of water throughout the wet season, potentially extending throughout the year.



**Vegetated Swale** - A vegetated swale is a broad, shallow channel with dense vegetation covering the side slopes and bottom. The vegetation in the channel provides filtration and solids removal and reduces flow velocities as the flow is conveyed through the system.



**Vegetated Buffer** - Vegetated buffer strips are sloping planted areas designed to treat and infiltrate sheet flow from adjacent impervious surfaces. They are most often planted with grass, though other uniformly distributed plant species are also appropriate.



**Constructed Wetlands** - Constructed wetlands are man-made wetlands designed to collect and purify stormwater through microbial transformation, plant uptake, settling and absorption. Water is stored in shallow vegetated pools that are designed to support wetland plants.



**Vegetated Rock** - Vegetated rock filters are basins or tanks filled with gravel or other similar media that support vegetation. Stormwater flows through the rock media just below the surface, thus eliminating surface water but maintaining a sufficient seasonal or perennial water level to sustain the vegetation.



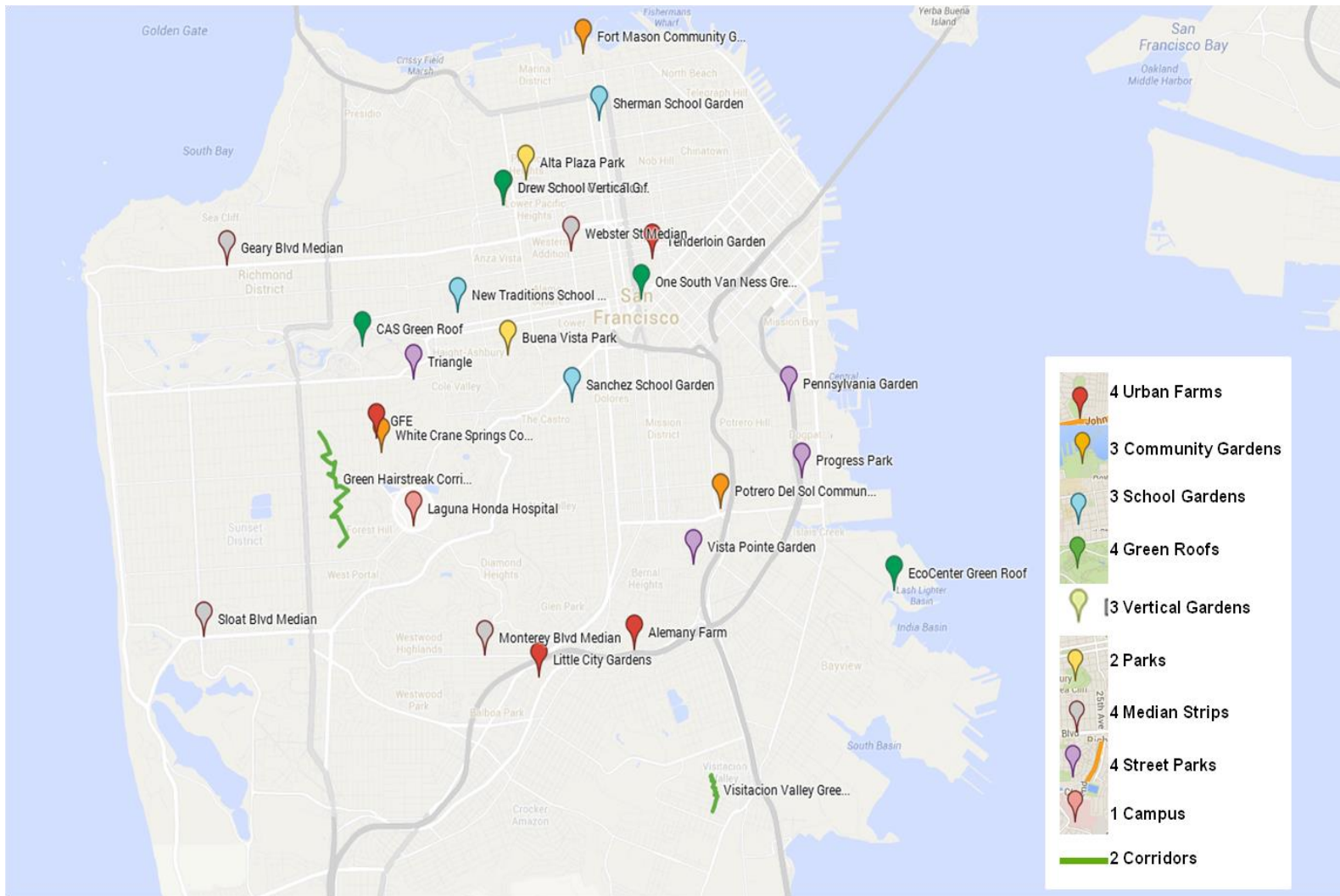
**Rain Gardens** - Rain gardens are stormwater facilities that rely on vegetation and either native or engineered soils to capture, infiltrate, transpire and remove pollutants from runoff. The vegetation can tolerate periodic inundation and contain engineered soils with high organic content.

# II. Biodiversity in Urban Greening Areas

## 1. Selection of Sample Areas

In order to have concrete examples of how biodiversity is promoted in the urban environment of San Francisco, we visited sample sites of urban greening areas throughout the city, all of which are represented on the "Google Map" below.

We only visited sites where we were invited and where a person in charge could show us the greening area and respond to our questions.



Map showing the sample of visited urban greening areas in San Francisco

## 2. Questions Asked During the Interviews

Below are the questions that we systematically asked during the interviews at each of the sites. We began with asking for a general description of the area, then for a definition of what they consider biodiversity to be, and eventually to list, as precisely as possible, the different types of animals, wild plants, and fungi that they often encounter inside the studied area.

- *General description of the site*
- *What do you consider to be biodiversity at your site?*
- *Which wild animals, plants, and fungi do you see at your site?*
- *How do you think your site contributes to the city's biodiversity?*
- *Do you have any ideas for how to improve biodiversity at your site?*

We traveled to each green area by bike or public transportation and brought a good quality camera in order to develop the visual aspect of our study with pictures of our experiences of nature in the city.



*California poppy (Eschscholzia californica)*

### 3. Results by Typology with Examples

This section presents all the visited urban greening areas and explains how they integrate biodiversity and nature in the city.

#### A. URBAN FARMS

Urban farms in San Francisco are great spots for biodiversity in the city because they are often vast areas of natural content. They are usually made up of mostly green vegetable crops, but can also include fruit trees, hives, and floral plants as well as native plant habitat.

Since urban farms are important cultivated areas, they can also result in the attraction of little mammals such as possums, raccoons, or gophers. These creatures can be seen as a nuisance, but usually people just let them live as a part of the natural area. Butterflies are seen and studied in abundance at urban farms as well, exemplifying their strong promotion for wildlife.

#### Alemanya Farm

*Alemanya Farm* was created in 1995 and is an urban farm of 3½ acres on Recreation and Parks Department land. It is a communal farm managed by volunteers and lives strictly off donations due to the fact that nothing is sold.

*Alemanya Farm* is a great example of a diversified open space. Not only is there traditional food farming, but also an eclectic terrace area with fruit trees and grape vines, a greenhouse used as a nursery, a native plant area, and bee hives. A little stream is still crossing the urban farm and creates a riparian habitat.

*Alemanya Farm* is well known as a great spot to observe birds, bees, and butterflies.



*Gulf Fritillary Butterfly (Agraulis vanillae), Bumble bee (Bombus sp.), and Anna's Hummingbird (Calypte anna) all photographed at Alemanya Farm*

## Little City Gardens

---

*Little City Garden* was an urban farm that sat on  $\frac{3}{4}$  acre of private land. This farm was an experiment in the economic viability of small-scale urban market gardening. The aim of the farm was to be self-sufficient by cultivating mostly greens, some medicinal plants, and cut flowers. The farm had to shut down in 2016.

*During its tenure at the site, people working there saw a noticeable increase of wildlife inside the farm area such as birds, butterflies, and solitary bees. This speaks to the relevance urban farms have in relation to promoting biodiversity in the city.*



*Little City Garden Urban Farm*

## Tenderloin Garden

---

*Tenderloin People's Garden* was founded in 2010 as part of Tenderloin Neighborhood Development's campaign for Food Justice and is a volunteer-led urban farm. It is made of 3 main features - the food garden, the ornamental plants area, and the vertical garden. The vertical garden was created in 2013 by a garden volunteer who was also an architect.

*Even though it is a small garden located in City Hall Plaza with lots of traffic, birds and butterflies are still often seen inside.*



*Tenderloin Garden Urban Farm*



The *green wall* illustrates an innovative way of gardening. Since we have a constant lack of open land within the city, green walls can help. In this garden, they built a green wall with little bags of soil containing lettuce, onion, and bok choy.

*Vertical garden in Tenderloin Community Garden*

## Garden for the Environment

---

*Garden for the Environment* is an organic demonstration garden on San Francisco Public Utilities Commission land, offering weekly workshops on organic gardening, sustainable landscaping, and urban composting. The garden organizes youth programs and the *Gardening and Composting Educator Training Program*.

*This garden's primary focus is on educating people about environmental issues and biodiversity.*



*Garden for the Environment, Urban Farm*



## B. COMMUNITY GARDENS

A community garden is any piece of land gardened by a collective group of people, utilizing either individual or shared plots on private or public land. These gardens are great places for people to connect with fellow gardeners and socialize about their own gardens and practices.

Like urban farms, this type of urban greening area is a prime spot for nature and biodiversity. Since they can be found all around the city, they promote natural shelters for many different animals - such as birds, butterflies, bees, and little mammals. They also encourage people to garden and, therefore, look more carefully at nature and their environment when they manage a plot of land.

*People do not only grow vegetables at community gardens; often times you can see plots with cultivated native plants, ornamental flowers, cacti, grasses, and other plants.*

### Fort Mason Community Garden



*White Crown Sparrow (Zonotrichia leucophrys), Cabbage White Butterfly (Pieris rapae), Bumble Bee (Bombus sp.), and Honey Bee (Apis sp.) at Fort Mason Community Garden*

Fort Mason Community Garden is located in the Golden Gate National Recreation Area and is composed of more than 100 individual plots, a few common areas, a hill with only California native plants, a cactus garden, some individual greenhouses, and a little orchard. It is a very diverse area surrounded by open space. *It is a perfect spot for butterfly and bird watching.*

## Potrero del Sol Community Garden

Potrero del Sol Community Garden is located on about ½ acre piece of land owned by SF Recreation and Parks. It is made up of 75 plots, 2 honey bee hives, and around 100 people who are involved in the garden.

*Potrero del Sol is an excellent example of a natural space thriving in an urban environment. The community garden is in close proximity to highway 101, creating a unique contrast. This contrast is important as it allows people to realize that nature can grow almost anywhere – even in the built environment.*



*Potrero del Sol Community Garden*

## White Crane Springs Community Garden

Located on City land, this garden consists of 85 individual plots and 5 public plots including the spices garden, the flower garden, and the mushroom garden. You can also find an orchard, a green house, a native plants garden, and 5 hives for native bees.

The native plants area is well known by the gardeners here as an effective aide for attracting pollinators to their crops—a recognition that is improving amongst gardeners today. Also, the bees that live in the garden are yellow jacket bees which eat aphids and are a good predator against pest insects.

*This is a good example of how we can use natural methods to fight against pests and at the same time protect our local species.*



*White Crane Springs (WCS), Community Garden*



*Native plant area in WCS garden*

## C. SCHOOL GARDENS

Biodiversity is mainly promoted in school gardens by the transmission of knowledge. Indeed, an important thing to do if we want to raise the awareness of the population to biodiversity is to improve public education to educate our children who will be the future managers of our cities.

*The students learn about nature and biodiversity in these gardens, and the gardens are also natural shelters for flora, fauna and fungi, like the gardens mentioned above.*

### New Traditions Elementary School

New Traditions has three different green areas: an edible garden with beds of vegetables and fruits cultivated by the students with the help of the garden teacher; a butterfly habitat garden that has been created to attract butterflies; and a native plant garden, that is a tool to teach the students about biodiversity.

The fact that the school garden is made of different features, promotes biodiversity. Moreover, butterflies are seen a lot thanks to the butterfly garden. The native area helps to teach the kids about all the good properties of natives: they adapt better to the weather of San Francisco, they use less water and management, and they encourage people to protect their local natural environment.



*Edible Food Garden*



*Native Plant Garden*



*Butterfly Habitat Garden*

## Sanchez Elementary School Garden



*Sanchez School Edible Food Garden*

Sanchez Elementary School Garden is incredibly diverse and features the following:

- Edible food garden with 8 beds made to grow food
- Garden with grasses and shrubs
- Garden with tomatoes and peppers
- Pollinator garden with flowers that bloom during different seasons in order to attract pollinators all throughout the year
- Small orchard
- Little greenhouse
- 2 vertical gardens. Both are closed systems with a tank underneath the wall to provide water with nutrients. One of the vertical gardens has fish inside its tank which clean the water by eating waste produced by the plants, while also filtering the water before it goes back up the wall to feed the plants. It is a symbiosis between plants and fish.

*This garden has a very diverse range of green areas which create a lot of different opportunities for the students to learn about nature and biodiversity.*



*Mushrooms in the Shrubby Garden*

## Sherman E. School

---

The Sherman E. School Garden also has a lot of different features - all built into one playground. The features include an edible food garden, an herb garden, a native plant garden, a butterfly garden, a pond, a greenhouse, and an amphitheater to teach science to the students.

*Each month, the garden opens to the public helping to make people more aware of nature, gardening, and environment topics.*



*Native Plants Garden*



*Edible Food Garden*



*Pond*

## D. GREEN ROOFS

In this study, we visited four of San Francisco's green (or "living") roofs. These structures provide many benefits such as regulating the heating and cooling of a building by insulation, managing stormwater, reducing noise inside the building, reducing the urban heat island effect, and by having an aesthetically positive and pleasing impact on people.

Living roofs in San Francisco are a new and innovative way of promoting nature and biodiversity. They are generally planted with diverse species that attract wildlife. In a city with a permanent lack of ground space, utilizing the limitless unused roof space available for green roofs can be a great way to add more greening areas.

The four San Francisco green roofs we visited harbor a very diverse palette of Californian native plants in a small area, which is strongly promoting biodiversity in the city and also offering new shelters for birds and certain insects.

### EcoCenter at Heron's Head Park



*EcoCenter Green Roof (1)*

*The EcoCenter roof was a great way to create more habitats for wildlife within the park.*

This green roof is a 1,100 square-foot extensive living roof on top of the EcoCenter building at Heron's Head Park. The green roof was designed to fit in with the surrounding environment, which is a 24-acre park located in the southern waterfront of San Francisco and is home to salt marsh and upland restoration, walking paths, bird-watching, environmental education activities, and more.

In 2013, 20 species of Californian native plants have been listed on the roof. There are also 2 "vernal pools" that birds enjoy.

*EcoCenter Green Roof (2)*



## Drew School

---

The Drew School green roof was installed in 2009 with 14 different species of California native plants. It is a great spot for biodiversity due to the concentration of various plants in a small area, which attracts diverse animals such as 4 native species of bees and 8 different species of beetles.



*Drew School Green Roof*

## One South Van Ness

---

This green roof was created in July 2010 with the ultimate goal of becoming “self-sustainable.” 13 perennial plant species have been planted in a bio-tray substrate system on the roof. Birds, butterflies, bees, and other insects are visible there.



*One South Van Ness Green Roof*

## California Academy of Sciences Green Roof



*California Academy of Sciences Green Roof*

The living roof of the California Academy of Sciences spans across 2.5 acres and was completed in 2007. In total, there are approximately 1.7 million native plants from 75 different native species inhabiting the green roof. The plant species have been specifically selected to attract habitat for native wildlife - for example, 39 arthropod families and 38 bird species have been seen on the roof from June 2009 to February 2011 according to the *Citizen Scientist Program of the Academy*<sup>7</sup>.

The roof also hosts other features such as a Californian native bee box, created by Xerces Society, and a supply of rocks and wood pieces that can be transformed as shelters or nests for animals.

*The number of species living on the green roof is increasing every year. This demonstrates that biodiversity is not just protected here, but also enhanced through time.*



*Native Solitary Bee Box*



*CAS Green Roof, view of de Young Museum*



## E. VERTICAL GARDENS

Vertical gardens can provide much of the same benefits that green roofs offer like regulating the temperature inside the building, reducing the sounds that come from the street, improving air quality, and reducing the urban heat island effect.

As for biodiversity benefits, green walls are very attractive for birds and many types of insects, especially when the wall is flowering. It is also attractive for the humans and raises curiosity for nature in the city.

Green walls covered by only one species of climbing plant did not seem pertinent for our study on biodiversity so, for the purpose of this study, we only focused on green walls that include a system with roots away from the structure.

### Sanchez E. School & Tenderloin Vertical Gardens

Both the Sanchez E. School and Tenderloin Community Gardens have vertical garden portions with a principle purpose of creating new space to grow edible food because of the lack of ground space.

*The aesthetic walls capture the community's attention and give an opportunity to educate people on green infrastructure – plus little insects just love them!*



*Sanchez School Green Wall*

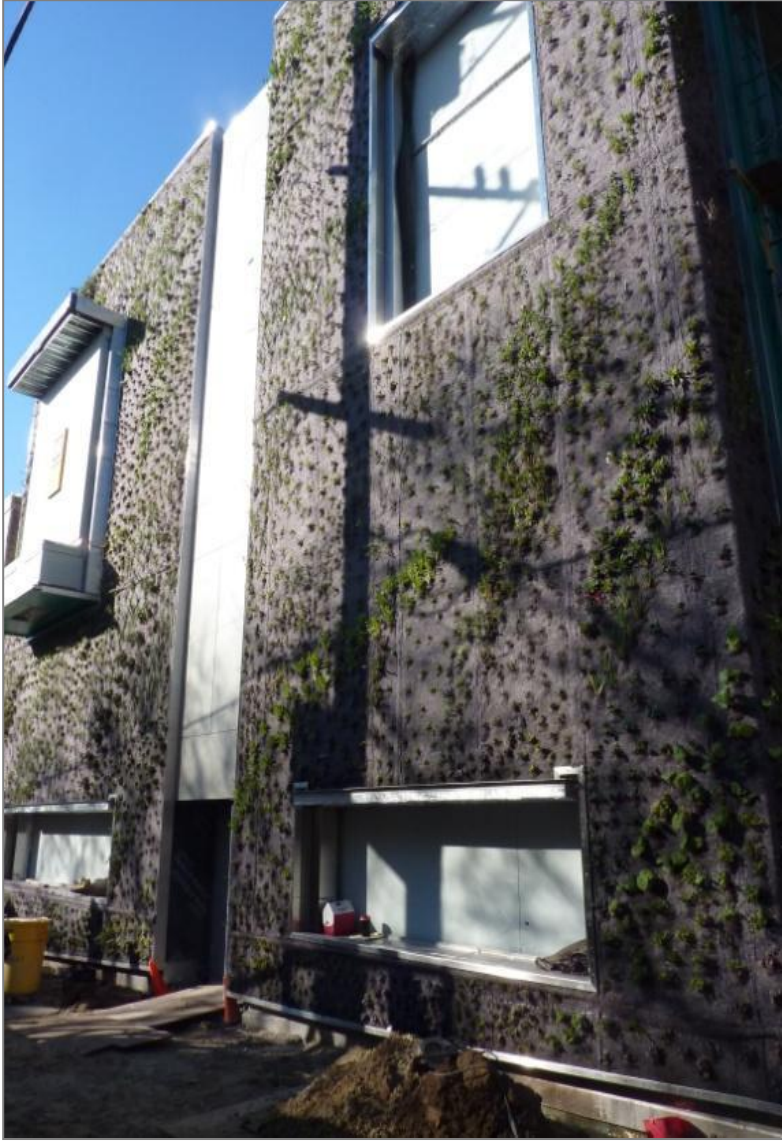


*Tenderloin Garden Green Wall*

## Drew School

---

The Drew School vertical garden is a famous green wall designed in early 2011 by Patrick Blanc, French botanist and specialist of vertical garden design. The wall is 40 feet high by 60 feet wide and is made of 125 different species of plants. Patrick Blanc used only California-native plants for this wall with the drought resistant plants on the top and the ferns, which need a lot of water, on the bottom (2018 update – the ferns appear to have become dominant across the face of the wall).



*Drew School Green Wall in Winter 2011  
(Source: Drew School)*



*Drew School Garden in winter 2013*

## F. SMALL AND MEDIUM PARKS

In order to examine how small and medium parks promote biodiversity in San Francisco, we have selected two examples of interesting park management cases that involve native plants.

### South Side of Alta Plaza Park



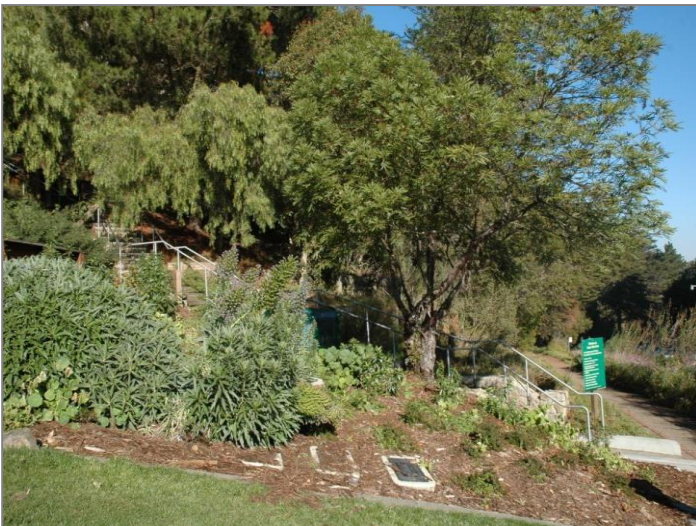
*Alta Plaza Park, South Side*

100% of the high water-use turf grass that used to be on the 4 acre south area of Alta Plaza Park was removed in June 2012. They replanted the lawn with a no-mow native grass (mix of 40% *Festuca rubra*, 30% *Festuca occidentalis*, and 30% *Festuca idahoensis*)<sup>8</sup>.

The no-mow is a native grass with a longer length so insects and other very small animals can hide in it. Also, it is a good initiative from DPW to choose to implement a native type of grass to save water use and reduce pesticides use.

### Buena Vista Park Southeast Slope

On the southern slope of Buena Vista Park is a native plant area that was created in 2011 and contains more than 25 different Californian native plant species.



*Buena Vista Park, South Side*

*Some of the native plant species such as the Santa Cruz Island buckwheat, deer grass, coffeeberry, and the red flowering currant were selected because of their bird attracting qualities.*

Native plants have been selected to improve wildlife in the park, but also to reduce the water and pesticide use on this area.

This park is a great example of how to not only think about the aesthetic aspect when planning a park, but also the maintenance, cost of management, and biodiversity.

## G. MEDIAN STRIPS

For this study, we examined median strips throughout the city that are fitted out as little gardens and feature diverse plants. These types of medians promote biodiversity by putting more vegetation in the middle of the streets and also promote green connections between larger and more diverse green areas.



*Monterey Boulevard Median Strip*

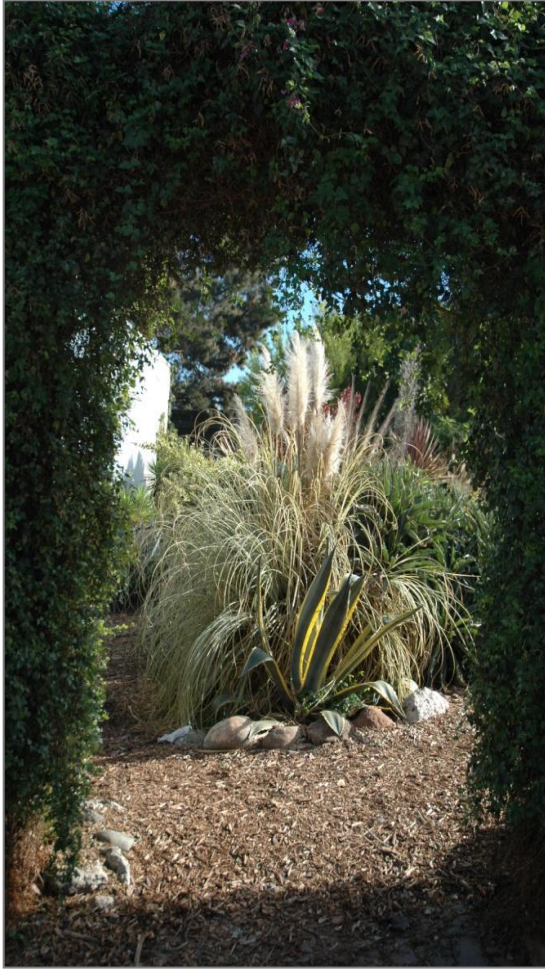
Median strips are interesting greening spots with great potential for planting more native plants. Ideally, medians should not need any maintenance nor additional water. Natives are the best option because they need little maintenance since they are already adapted to the Mediterranean climate in San Francisco. It is also a great way to teach gardeners planting the medians about the qualities of native plants.



*Sloat Boulevard Median Strip*

## H. STREET PARKS

There are various types of street parks in San Francisco that come in all shapes and sizes like sidewalks, triangles, steps, etc. Any Public Works unused land can be transformed into a street park and maintained by the neighbors.



*Pennsylvania Garden*



*Progress Park*

*This is a great way to get citizens involved in urban greening and have them care about nature and biodiversity.*

*Vallejo Street Steps*



## I. PUBLIC CAMPUSES

Laguna Honda Hospital replanted the area directly in front of the hospital's main entrance. They discussed the plant palette with San Francisco native plant specialists and did use more native and drought-adapted plants in their new design.

*If this area were correctly planted, it could be an important wildlife habitat between Twin Peaks and Mt. Davidson parks, which are significant natural areas close to the hospital's campus.*



*Laguna Honda Hospital Replanting Area*

## J. GREEN CORRIDORS

We visited two green corridors for this study: Visitacion Valley Greenway and the Green Hairstreak Corridor. These two green corridors are great spots for biodiversity and are both organized as a series of gardens on hilly areas in residential neighborhoods. They beautifully mix art and nature together, adding to the visually attractive aspect of the projects.

### Green Hairstreak Corridor

The Green Hairstreak Corridor was created to protect and restore one of two remaining populations of *Green Hairstreak butterflies* that still exist in San Francisco. The butterflies were restricted to the Presidio and two distinct hilltop populations in the Inner Sunset District. The populations were small and isolated in the neighborhood, and they were in danger of vanishing totally.

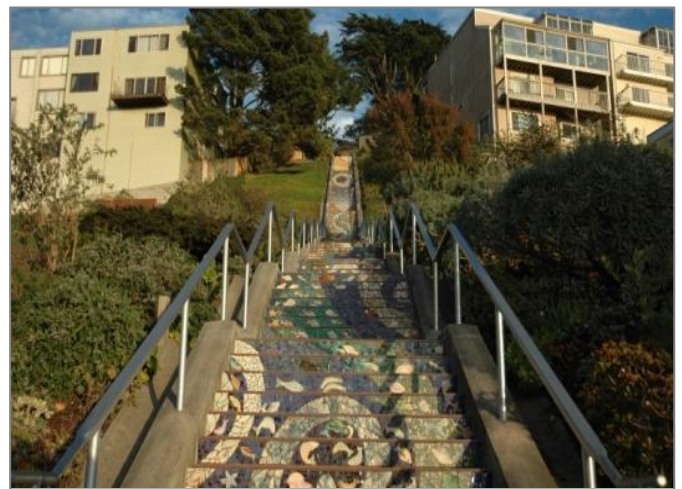
Therefore, inspired by local lepidopterist Liam O'Brien, since 2006, the organization Nature in the City has managed the corridor. The project connects these populations of butterflies to each other with strategically placed street parks planted with the hairstreak's habitat and is cared for by neighborhood residents and schoolchildren.



*14<sup>th</sup> Ave & Pacheco triangle*



*Quintara steps*



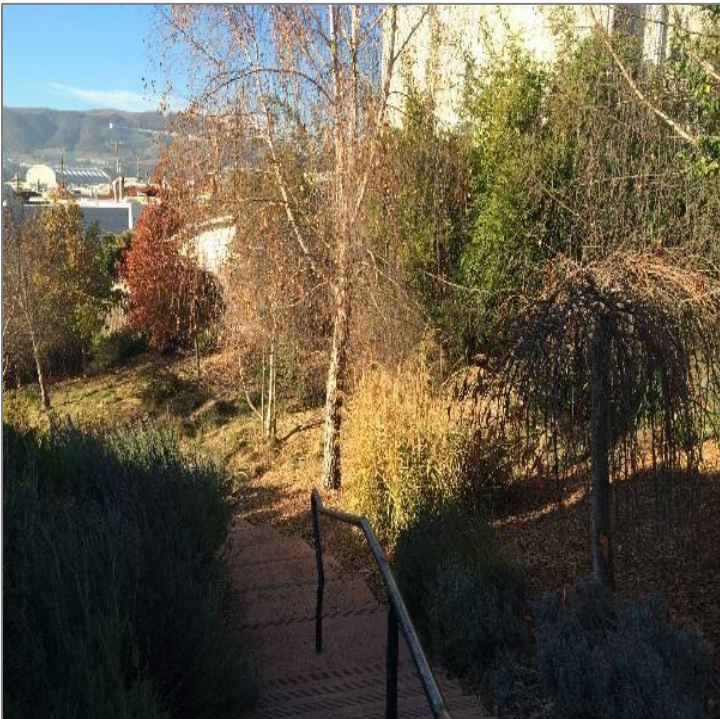
*Moraga steps*

## Visitation Valley Greenway

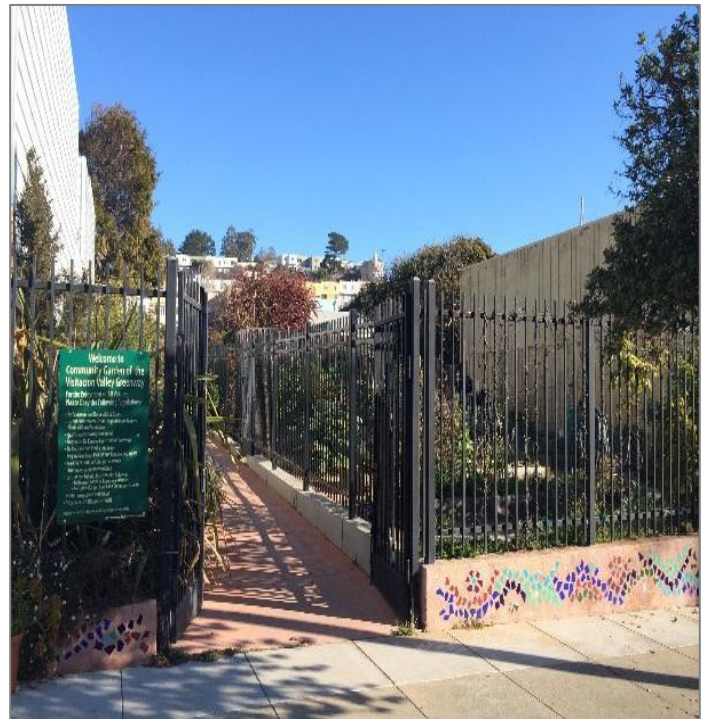


*Herb Garden*

The Visitation Valley Greenway is composed of a diagonal series of six publicly owned parcels (each a block long) and functions as a corridor of native and other beneficial plants that attract insect and avian pollinators.



*Children's Play Garden*



*Community Garden*



# III. Discussion, Recommendations, and Resources

## 1. Discussion of Visited Urban Greening Areas

In summary, we strived to emphasize the importance of native plants and their contribution to biodiversity. When mentioning native plants, we are ideally talking about plants native to San Francisco, which means plants that were living and flourishing here before humans altered their habitat through construction and urbanization.

Overall, the concept of biodiversity was well known throughout the visited urban greening areas, and even the ones who were not as familiar showed that they are willing to learn and adopt better practices. It is imperative that people in the community understand the urgency to protect native species and that our impact is not negligible. This is one reason why public outreach is so important. *Garden for the Environment* was a great example of an education site that raises awareness about environmental issues and makes urban greening a topic of public concern.

We saw a lot of native plant zones at many of the visited sites. In school gardens, urban farms, and community gardens, native plants were commonly used to attract pollinators and teach community members about the advantages inside their garden. In particular, the green walls and green roofs in the city often incorporated California native plants, many even San Francisco natives, which provide truly valuable qualities. These native species attract beneficial native pollinators because they are able to recognize the plant species, are adapted to the climate conditions of San Francisco so they need minimal management and water, and they are also a part of San Francisco's natural heritage and history.

In all the sampled areas, we saw a very wide range of birds, butterflies, hummingbirds, honey bees, native bees, bumblebees, and other insects. We also encountered a lot of bee hives, especially in community gardens and urban farms, which provide a steady supply of good pollinators and aide in the overall honey bee crisis.

There are still many things to improve upon, and we found that a lack of financial support is a common barrier slowing down progress for the green areas. For example, some community gardens do not have the money to create a space only for native plants.

We also learned that there are very few outreach events or classes about biodiversity in the gardens. It would be great to have more programs that would enhance awareness about nature and biodiversity issues and let people know what type of native plants they should use and why. The community gardens are great places for outreach since they gather so many different residents of San Francisco.

To conclude, if we provide more information and resources related to San Francisco's biodiversity, community members will become more aware and better understand how to preserve the city's unique and diverse natural landscape.

## 2. Biodiversity Ratings

Below is a table of all the visited Urban Greening Areas with a rating on a scale from 1– 5 (5 is the best) to measure, in our own opinion, their level of importance for biodiversity promotion.

Urban Greening Areas	Rating	Rating Comments
<i>Green Corridors</i>	5	In our opinion, Green Corridors are the best example of promoting biodiversity inside the city. They create real connections between different natural areas of wildlife habitats, and therefore, provide a secure pathway that allows wildlife to travel between them and establish healthy habitats.
<i>Urban Farms</i>	4	Urban Farms attract many species of birds, butterflies, pollinators, and little mammals. They also have a very diverse range of plants (including natives). People working there are aware of biodiversity issues.
<i>Street Parks</i>	4	The main goal of street parks is to create new habitats for wildlife and to involve neighbors in their local environment.
<i>School Gardens</i>	4	School Gardens teach kids how to take care of plants, to be aware of nature conservation issues, and about their future environment.
<i>Backyard Gardens</i>	4	Wildlife is very often observed by backyard garden owners. People learn more about biodiversity in their private space that they use every day.
<i>Community Gardens</i>	3	They attract wildlife, but people are not always aware about biodiversity issues. Although, they are very willing to learn.
<i>Campus</i>	3	It depends on what type of greening area we install inside the campus, but they are still good spots for wildlife.
<i>Green Roofs</i>	2	Green roofs are a new and innovative type of green area; attracting birds, butterflies, and other insects. However, they are a still isolated, not very well known, and often not open to the public.
<i>Small and Medium Parks</i>	2	These green areas are good shelter for birds but are not very diverse and made up of mostly grass that does not promote much biodiversity.
<i>Green Walls</i>	1	They are visually very attractive, but we don't see a lot of biodiversity on the walls even though the birds love the blooming flowers on it.
<i>Median Strips</i>	1	Median strips are often non-native plants, but they are trying to improve practices, especially knowing that native provide less maintenance needs.

### 3. Recommendations

After interviewing people at the urban greening areas and listening to their feedback, we were able to formulate some ideas on how and where improvements can be made.

First, we need an easier access to local native plants in San Francisco. People would then be encouraged to plant more native species in their gardens because they would be readily available.

It would also be great to have recommended lists of plants for each particular type of greening area. Urban farms, for example, could truly benefit from lists of native plants that help pollinate the crops or that attract insects and birds which will later kill aphids on crops. For median strips, it would be a list of native plants that are drought tolerant in order to reduce water use.

Another improvement would be to create more outreach and workshops focusing on biodiversity issues. It would be effective for people, especially in the community gardens, where a diverse population could learn about wildlife and biodiversity and spread the information to their families and friends.

The table below includes the strengths of all the different types of urban greening areas, along with a list of recommendations to increase biodiversity for each.

Urban Greening Area	Strengths	Recommendations to Increase Biodiversity
<i>Urban Farm</i>	Hosting pollinator insects, birds, and butterflies.	<ul style="list-style-type: none"> <li>• Native plant area (list of plants that people can use to attract pollinators or other good insects).</li> <li>• Mix native and edible vegetables</li> <li>• More trees for the birds (fruit trees)</li> </ul>
<i>Community Garden</i>	Raising awareness and knowledge about biodiversity.	<ul style="list-style-type: none"> <li>• More outreach in the gardens for the people to learn about biodiversity.</li> <li>• Donation of native plants that can help their crops (list of appropriate native plants).</li> <li>• More hives.</li> <li>• Boxes for native bees.</li> </ul>
<i>School Garden</i>	Teaching the students about biodiversity issues.	<ul style="list-style-type: none"> <li>• Create a specific class talking about biodiversity.</li> <li>• List of plants attracting butterflies for more butterflies gardens.</li> <li>• Plants for native bees, learning more about native bees.</li> <li>• Plant more trees (Education Outside and FUF).</li> </ul>

<i>Green Roof</i>	Using a very diverse palette of Californian native plants.	<ul style="list-style-type: none"> <li>• As much diversity as possible, with San Francisco native species (not just California natives) that require less maintenance.</li> <li>• Goal: a self-sufficient system.</li> </ul>
<i>Green Wall</i>	New space for greening area, visually attractive.	<ul style="list-style-type: none"> <li>• As much diversity as possible with San Francisco native species.</li> </ul>
<i>Small Park and Medium Park</i>	Creating shelters for animals inside the city.	<ul style="list-style-type: none"> <li>• More diversity of native plants that attract birds and butterflies and that reduce maintenance.</li> <li>• Add more shrubby areas and remove some lawn when it is not used for an entertaining space.</li> <li>• Teach people how to change their perception of a 'beautiful landscape', show that native plants are beautiful.</li> <li>• Use native grasses for lawns (less maintenance).</li> </ul>
<i>Backyard Garden</i>	Increase community awareness about biodiversity issues.	<ul style="list-style-type: none"> <li>• List of appropriate plants for a backyard garden.</li> </ul>
<i>Sidewalk Garden</i>		<ul style="list-style-type: none"> <li>• Teach residents how to choose more native plants and not just ornamental plants for their garden. Show them how beautiful the natives are and all the many qualities that they provide.</li> </ul>
<i>Street parks</i>		
<i>Median strips</i>	Increasing the possibility of using more native plants.	<ul style="list-style-type: none"> <li>• List of native plants that don't require maintenance.</li> </ul>
<i>University/Campus</i>	<i>Depends on the greening feature</i>	
<i>Green Corridors</i>	Creating connection and trails for animals and for plants propagation.	<ul style="list-style-type: none"> <li>• List of native plants that are specific good habitats for local animals.</li> </ul>

## 4. Resources

Typology	Links for Resources
<i>Nature in San Francisco</i>	<a href="#">Natural San Francisco</a> (SFE) <a href="#">Nature in the City</a>
<i>Urban Farm</i>	<a href="#">Urban Agriculture Permits</a> (SFE) <a href="#">Alemany Farm</a> <a href="#">Bay Institute</a> <a href="#">EcoCenter</a> <a href="#">Garden For the Environment</a> <a href="#">Little City Gardens</a> <a href="#">Tenderloin Garden</a>
<i>Community Garden</i>	<a href="#">Sfgro Garden Resource Organization</a> <a href="#">List of SF community gardens</a> (SFE) <a href="#">Fort Mason Garden</a> <a href="#">Potrero del Sol Garden</a> <a href="#">White Crane Springs Garden</a> <a href="#">SF Rec and Park – Community Gardens Program</a>
<i>School Garden</i>	<a href="#">School Gardens</a> (SFE) <a href="#">Education Outside</a>
<i>Green Roof</i>	<a href="#">Greener and Better Roofs</a> (SPUR) <a href="#">California Academy of Sciences Roof</a> <a href="#">Drew School Roof</a> <a href="#">One South Van Ness Roof</a>
<i>Green Wall</i>	<a href="#">Drew School Vertical Garden</a>
<i>Small and Medium Parks</i>	<a href="#">Parks and Open Spaces</a> (RPD) <a href="#">Delta Blue Grass</a>
<i>Sidewalk Garden</i>	<a href="#">FUF</a> <a href="#">PUC</a>
<i>Street parks</i>	<a href="#">Public Works</a> <a href="#">Parks Alliance</a>
<i>PUC BMPs</i>	<a href="#">Stormwater Best Management Practice Fact Sheets</a>
<i>Green Corridors</i>	<a href="#">Green Hairstreak Corridor</a> (Nature in the City) <a href="#">Visitation Valley Greenway</a>