Past, Present and Future of Monarch Grove Sanctuary: Conservation Lessons from Potted Trees in Pacific Grove, California

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Abstract

Conservation efforts at the Monarch Grove Sanctuary, California, described in this unique example began as an emergency mitigation project for monarch butterflies. In the course of time, those efforts have evolved and expanded with the interest and involvement of a small group of concerned citizens. The conservation efforts of placing potted trees to fill gaps in the tree canopy required by monarchs have become inextricably bound up in local policies, conveyance of information, participation of community activists, and governmental consideration of community-based conservation actions. In this paper, we describe (1) the importance of the circumstances and ideas behind this potted tree conservation project, (2) the response of monarch butterflies and the community to the potted trees, and (3) how this project may cause a much needed shift in policy toward monarch habitat conservation and restoration efforts.

Historical and Conservation Context

The Monarch Grove Sanctuary ("Sanctuary") is one of the oldest known and most permanent sites for overwintering monarch butterflies in California, dating back to at least the late 1800's (Brower 1989). Located along the central coast of California, the Sanctuary is snugly situated within the city of Pacific Grove along the western edge of the Monterey Peninsula. Pacific Grove's infamous logo –

"Butterfly Town, USA" – is due to its annual congregation of overwintering monarchs. The Sanctuary is one of two largely undeveloped parcels (the other parcel being Washington Park) in Pacific Grove that are responsible for bringing monarch popularity to the city. An array of unique city ordinances and agreements have provided legal protections to the Sanctuary, several of which are for the sole purpose of protecting monarchs and their habitat in perpetuity. However, these protections are at times stretched due to complicated local government policies, lack of oversight and stewardship, failures to actually implement much-needed management and restoration activities, and lack of an appropriate role for community-based conservation. These issues are invariably intertwined with Pacific Grove and its unique history and conservation background.

The chronicle of conservation at the Sanctuary really begins with its rich historical context. The remnant urban forest at the Sanctuary has been subject to various human disturbances for hundreds, if not thousands of years. Native Costanoan people regularly modified the Monterey Peninsula's forested lands by setting various ground and forest fires for purposes of maintaining an array of desired plants and animals. However, it was not until the Spanish era when much of the forested region was converted to grazing lands to raise cattle. In addition, forested regions on the Peninsula were logged around the 1850s. Post-logging fires were used to establish grassland areas more suitable for cattle grazing. Following this period of environmental impacts, few fires returned to the area (Brower 1989).

The landscape began to transition again as Euro-Americans took an interest in the Peninsula beyond grazing cattle. The area that is now Pacific Grove has its foundations as a three week-long religious retreat. As the popularity of the retreats increased, organizers and participants left wooden tent frames standing all year, while canvas tent material was stored elsewhere. Robert Louis Stevenson described the area in 1879 as a deserted village with an appearance of a small town. Pacific Improvement Co. began clearing land and building houses in 1880, and by 1882, the Del Monte Hotel was completed, attracting more visitors to the Monterey Peninsula. As a result, more people began

establishing permanent residences in Pacific Grove, acquiring land parcels, and clearing land to build new homes.

The actual parcel on which the Sanctuary is located was owned by a former manager of the Del Monte Hotel between 1912-1923. The property was obtained by the Del Monte Military Academy in 1924. Significant amounts of building activity occurred at that time. The Del Monte Academy was one of the very first of such academies for young boys during that time period. The establishment of such academies grew, following World War I, from a national desire to train and organize young boys and men to be prepared for future military conflicts and an uncertain future. The Academy operated from 1924 to 1931. Over 1,000 cadets attended the Academy. Letters and historical documents from past students of the Academy describe fondly remembering large numbers of monarchs on the school grounds.

As the Great Depression set in by 1931, the Del Monte Military Academy slid into default. And by 1934, the State Emergency Relief Administration leased the property as a forestry camp for the California Conservation Corps. Young men were based at this forestry camp cutting fire breaks for fire hazard reduction on the Monterey Peninsula, Carmel Valley, and the Carmel Highlands. Following this period of forest alteration, several more buildings were added to the property in the 1940s, further reducing the forested area around the current-day Sanctuary. The historic Del Monte Military Academy was then purchased by Edna Diveley who operated it as a hotel from 1946-1964. Portions of the property were sold off over time, but the Sanctuary property was held by the Diveley's until 1992.

Around 1987, however, Mrs. Diveley moved forward on subdividing the remaining property that was largely forested with Monterey pines, Eucalyptus, and Monterey cypress. The subdivision map approval under the California Environmental Quality Act (CEQA) was sought in order to divide a 2.7-acre parcel into five single-family lots and a single multiple-family/motel lot. The single-family lots ranged from 0.33-0.43 acres; the multiple-family lot was approximately 0.78 acres. The Environmental Impact

Report required under CEQA stated that the opinion of a consulting monarch expert was such that the maintenance the overwintering monarch colony would not be possible under the proposed subdivision. Moreover, the remaining area supposedly would have been too small, too degraded, and too environmentally stressed for the monarchs' continued annual use of the overwintering site. As such, it was determined that a significant unavoidable impact would occur on monarchs and their habitat from the proposed subdivision, but habitat restoration was feasible. Several mitigation measures were proposed:

1) An alternative project design that conforms with development limitations identified by the consulting monarch expert, whereby development would be limited to buildable areas of the site identified by the monarch expert and all non-buildable areas would be preserved through a conservation easement or other agreement prior to subdivision approval.
2) The City was to develop a habitat restoration and management plan program to ensure that undeveloped areas of the property were protected, restored, and managed as per the monarch consultant's recommendations.
3) Funds were to be provided in order to prepare and implement a habitat restoration and management plan for monarch butterflies.

Speaking to the importance of monarchs to local people, the number one issue of concern by local citizens about this subdivision was the potential impact it would have on monarchs and their habitat because of site was unique overwintering habitat within their community.

The City of Pacific Grove purchased the Diveley property in 1992 for about $1.4 million through a citizen-approved bond measure in 1990 and through additional funds from the California State Wildlife Conservation Board. Negotiations resulted in 2.2 acres that would be established as a permanent monarch butterfly preserve, protecting perhaps the most critical area of the property for the monarchs' continued overwintering congregation. As part of the purchase, a conservation easement was granted

by the City of Pacific Grove to the State of California. The city bears the responsibility of stewardship set forth in the easement. The easement has the express purpose to "preserve, restore and enhance the natural character of the property and prevent its use or development for any purpose or in any manner which would conflict with the maintenance of the property as a refuge for overwintering monarch butterflies." The easement states plainly that the "removal, destruction or cutting of trees, shrubs or other vegetation" is prohibited unless approved by the State of California and no activities, actions, or uses shall in any way be detrimental to habitat preservation. The easement encourages restoration and habitat enhancements by articulating that all of the prohibitions set forth in the easement do not apply to activities designed for restoration and enhancement of monarch overwintering habitat at the Sanctuary.

While this conservation easement was of monumental importance, legal protections were instituted early by the City with the foresight to protect overwintering monarchs as a significant natural treasure. In 1952, the City declared it "unlawful for any person to molest or interfere with, in any way, the peaceful occupancy of the monarch butterflies on their annual visit to the city of Pacific Grove, and during the entire time they remain within the corporate limits of the city, in whatever spot they may choose to stop in . . ." (Ord. 210 N.S. § 8-3060, 1952). But it was not for about 40 more years when the city drafted another ordinance to protect monarchs, by establishing Monarch Grove Sanctuary as a public park (Ord. 08-006 § 50, 2008; Ord. 1912 N.S. § 1, 1993). In 2002, Pacific Grove protected monarch habitat further under their tree ordinance, strictly prohibiting "[p]runing or removal of trees in protected monarch overwintering sites except as prescribed in an approved habitat management plan or upon a finding by the city council that such is necessary for proper maintenance of the site or for public health, safety or welfare." (PGMC 12.16.250(b): Ord. 07-015 § 30, 2007; Ord. 02-13 § 3, 2002. Formerly 12.16.240). The city code expressly states that approved "pruning or removal of trees in designated monarch butterfly overwintering sites, or within 100 yards of any boundary of such site, shall be prohibited during the months of October through April unless deemed necessary by the city council

for public health, safety or welfare." PGMC 12.16.250(c).While these municipal codes protect monarch habitat, Pacific Grove has additionally made it "unlawful for any person to molest or interfere with, in any way, the peaceful occupancy of the monarch butterflies on their annual visit to the city of Pacific Grove, and during the entire time they remain within the corporate limits of the city." Through these codes, Pacific Grove has demonstrated clear intent to protect the Sanctuary, monarch habitat within the city, and the monarch butterfly itself.

Both state-level and city-level protections act in protecting the Sanctuary. Pursuant to California Coastal Act of 1976 (CCA), monarch butterflies have been considered a significant coastal resource and their overwintering habitats deemed environmentally sensitive. As a result, the use of those overwintering sites were limited by state law. California Assembly Bill #1671 was passed in 1987, encouraging the protection of monarch overwintering habitats. The California Department of Fish and Game has listed the monarch as a state-rank S3, meaning that the species has 21-100 viable element occurrences, 3,000 – 10,000 individuals, or 10,000 – 50,000 acres. Generally, the California Natural Diversity Database (CNDDB) will assign one of three threat designation to the state rank (S3.1 = very threatened; S3.2 = threatened; S3.3 no current threats known); however, no threat designation has been assigned by CNDDB to date. As a result of these various state level and the municipal level protections for monarchs, the Diveley Environmental Impact Report was required to assess impacts to monarchs and their habitat into under CEQA. CEQA regulations themselves were of monumental importance in initiating the development alternative of the Diveley property and the subsequent conservation easement.

Since the approved subdivision, monarchs have continued to occupy the Sanctuary. However, substantial concern revolves around whether habitat conditions are suitable to sustain the monarch's annual overwintering congregation. It has become overwhelmingly clear that no action toward on-the-ground habitat restoration and management can severely degrade an area to render it completely

useless for overwintering monarchs. Washington Park in Pacific Grove is a prime example. Monarch numbers used to be more or less evenly split between Washington Park and the Diveley property in years prior to 1989 (Brower 1989). However, the 1989-90 winter marked a significant alteration in that pattern when for the first time no monarchs were in Washington Park. Now, monarchs are rather rarely sighted in the park, except when sporadic years of high abundance lends to spill-over. Thanksgiving monarch counts over the last decade indicate Washington Park is either not used by monarchs, or the park exists as low quality overwintering habitat compared to the Sanctuary. The degradation of Washington Park's urban forest suitable for overwintering monarchs is a direct result of human land uses and the lack of management and restoration activities that properly maintain monarch habitat. Those threats are the same threats that subject the Sanctuary to continued degradation and further jeopardize the monarchs' continued congregation in Pacific Grove.

Importance of Monarch Grove Sanctuary

The Sanctuary is one of few areas that is strictly protected for the sole benefit of monarch butterflies. As a result of that protection, the Sanctuary has become and remains a place of ecological, historical, inspirational, religious, cultural, and socioeconomic importance for many people locally, nationally, and internationally. Not only is the monarch butterfly's congregation important in and of itself, but overwintering congregations symbolize the fact that the monarch's migration occurs right in our backyards, that it is one of the few remaining large-scale animal migrations in the world, and that it is one of the most spectacular biological events that exist on our planet.

The conservation of habitat necessary to sustain the continued annual migration of the monarch butterfly in North America is one of paramount concern. In North America, the annual monarch butterfly (Danaus plexippus L.) migration covers the greatest spatial extent (up to 4800 km) of any other current insect migration, traveling from southern Canada to central Mexico’s Transverse Neovolcanic Belt or to coastal California (Urquhart and Urquhart 1978, Solensky 2004). Unfortunately, however, the

monarch migration has become a threatened biological phenomenon due to habitat destruction within overwintering sites in Mexico and coastal California, habitat degradation within the monarch's habitats, alterations of its migratory corridors, and lack of statutory protections (Brower and Pyle 1980, Pyle 1983a, 1983b, 1983c, Brower 1997, 1999; Wilcove 2008). Even in legally protected sites essential for overwintering monarchs, habitat degradation – even lack of habitat management – still exists in various forms and continues to compromise overwintering sites.

Need for Habitat Restoration at the Sanctuary

The need for monarch habitat management at the Sanctuary has been long-standing. Several reports from 1989 on monarch habitats in Pacific Grove drew attention to the need for habitat management (Brower 1989, Coats Consulting 1989, Leong 1990). Ro Vacarro, president of the former Friends of the Monarch, was instrumental in bringing an urgency to the fact that monarchs at the Sanctuary would be best served with various management activities to enhance habitat conditions. While some management actions may have been implemented between 1992 and 1998, few meaningful management activities were implemented until after 1998.

The real impetus on conducting management and restoration activities within the Sanctuary sprung from the proposed demolition of Brokaw Hall and its placement on the municipal Historic Properties List several years after the purchase of the Diveley property. Pacific Grove officials acted on various pressure in 1997 by developing a habitat management plan for the Sanctuary (Weiss 1998). This management plan identified that the L-shaped grove of Eucalyptus was vulnerable to catastrophic storms and it would eventually age to the point where it provided little benefit to the monarchs. Recommendations were made to put in another row of Eucalyptus in order to provide the correct microclimatic conditions needed for clustering sites in the future. That aspect of the plan was never fully implemented by the City and it laid relatively dormant until 2009 when the tree-trimming ensued by the city's Public Works Department. However, several actions were taken as a result of Weiss' (1998)

recommendations for management and restoration. The primary management action that was implement post-1998 was the planting of 15 Eucalyptus in a diagonal line (SW to NE) across the Sanctuary. Weiss' (1998) recommendations also included planting numerous Monterey pine and cypress, which was also implemented by the city.

During late September or early October of 2009, the L-shaped grove a Eucalyptus trees at the Sanctuary was extensively and intensively trimmed by a contractor hired by the City's Public Works staff. Several citizens contacted the City to determine what had happened and when the trimming had occurred. City officials replied that trimming in the Sanctuary was conducted in order to prevent hazardous limbs from falling on visitors, which was in response to a Monterey cypress limb that broke off in the Sanctuary parking lot and killed an elderly woman. City officials also were adamant that all trimming had been completed by the October 1st deadline set forth in Municipal Code 12.16.250(c).

The overwintering season of 2009 fell on Pacific Grove quickly. Thanksgiving counts at the Sanctuary showed that monarch numbers fell sharply in 2009: 17,866 monarchs in 2008, whereas only 793 monarchs occurred in 2009. Average number of monarchs counted by the Monarch Alert Program indicated the same pattern as the Thanksgiving count data. Storms came through Pacific Grove in January of 2010 causing monarchs to nearly vanish from the Sanctuary (January and February counts ranged from 3-300 butterflies; data from Monarch Alert).

Potted Trees as Mitigation and Restoration Potential

In response to the tree-trimming and subsequent decline in monarch numbers, we mounted a modest but passionate effort with other local citizens to provide some form of mitigation in hopes that monarchs would return to the Sanctuary in October 2010. Moreover, this unique crisis at the Sanctuary sparked a renewed sense of urgency to appropriately manage and protect overwintering sites for monarchs in Pacific Grove. With the global spotlight shining on Pacific Grove to adequately protect

monarch habitat, it was highly doubtful that the momentum toward monarch habitat restoration would be forgotten as in past decades. The monarchs, people of Pacific Grove, and the city itself all had something to gain from mitigating and restoring the Sanctuary.

At overwintering sites in coastal California, monarchs generally congregate on Eucalyptus or other tree limbs and leaves that range from 20-45+ feet, depending on various environmental factors (Leong 1994). This was the zone within which branches were trimmed at the Sanctuary and obviously the zone that provided a protective buffer against winds (Figure 1). After pondering the schemes to replace some vegetation structure within that zone, the logical and perhaps most feasible option was to place potted trees from nurseries in the Sanctuary to fill in those gaps. Because, earlier work had indicated that 81% of overwintering sites in California were groves of Eucalyptus and 16% of the groves were comprised of Monterey pine (Sakai and Calvert 1991), it was clear we needed mostly Eucalyptus and a few pines or live oaks. We kicked around the idea of using potted trees, contacted nurseries, and started hearing from landowners who wanted to get rid of Eucalyptus on their property. The nurseries had a few live oaks and Monterey pines and so we rounded up a few of those.

A private landowner contacted us regarding the potential for transplanting Eucalyptus from his property to the Sanctuary. We researched the best procedures for transplanting Eucalyptus trees and found a large degree of variation the methods and the success at transplanting those trees. With input from people as far away as Australia, the likelihood of successfully transplanting Eucalyptus trees sounded better than a zero percent chance. We only had something to gain by trying and so we moved forward on arranging for the transplants.

Transplant Process. In total, we used 43 potted trees. Thirty-eight 38 blue gum Eucalyptus were transplanted either from Fort Bragg (280 miles north of Pacific Grove; trees were 40-50 feet) or outside of Gilroy, California (45 miles northeast of Pacific Grove; trees were 10-30 feet). The bulk of Eucalyptus trees came from a five-acre parcel in Gilroy. Trees were dug up using a backhoe with a significant

portion of the root ball still intact. The root balls were placed in boxes or burlap material and transported to Pacific Grove. The transplant process of digging and transporting occurred within a 1-2-day period for each location, Fort Bragg and Gilroy. In addition, 14 live oak trees were purchased from a nursery in Gilroy, California, and transported to the Sanctuary.

We started moving potted trees into the Sanctuary in early September (Figure 2). By September 22, 2010, 43 trees had been moved to the Sanctuary. Acquiring and placing potted trees in the Sanctuary took 22 days, donations, and help from many people. In the end, the potted tree effort was dubbed “Operation Pacelli” and 43 potted trees were situated in the Sanctuary and neighboring yards just in time for the arrival of monarchs in October.

Filling Gaps. The decision of where exactly to place the potted trees came from many years of observations and videography of monarchs at the Sanctuary. Pacelli had been videoing monarchs at the Sanctuary for over 20 years and was extremely familiar with the locations were monarchs had congregated in years past. While it was clear that particular areas were trimmed so intensively that they required numerous potted trees to fill gaps in the low to mid-canopy, Pacelli also scanned his old videos from 2008 to fine-tune the locations where potted trees would be best located.

Potted Trees as Windbreak and Cluster Sites

October 8th was a day of good fortune when 30-40 monarchs were buzzing the potted trees and trying to cluster in some Eucalyptus trees behind the windbreak of potted oaks. The following morning, monarchs were clustering on the potted oaks, taking advantage of some broken sunlight. By the end of October, more monarchs were showing up at the Sanctuary and clustering on the oaks even after high winds would shake through the grove. Monarchs number reached over a 1000 at the Sanctuary by the end of October and most monarchs were spending the nights on potted oaks.

November 3rd marked an interesting transition in terms of where monarchs spent their nights and where they clustered. On November 3rd and 4th, Pacelli wrote the following:

> "The Monarchs no longer spend the night on the oaks, but are clustering higher up on potted and normal eucs. It looks like the old pattern, just a smaller scale. . . . [The Monarchs] have the oaks to provide windbreak on 3 sides of the potted eucs, about 3 of them over 30 feet help formed a mini canopy. Last year the cluster would try to form at sunset but could not stay the night like this year."

Observations on November 5th illuminated how monarch clusters were changing over time and with climatic variations. On a wet and cold morning on November 5th, Pacelli observed the following:

> "The Monarchs in overnight clusters seem to have moved from the south side of the eucs to the north. The clusters are from 15-40 feet higher than smaller clusters, but its good as the Monarchs have found new and more places to spend the night. . . . I think this is all good news compared to last year where the Monarchs just left after the rain and cold."

Indeed, monarchs were fairing much better than the last season of 2009-2010 as their numbers by early November had, on average, reached just over 1,900 according to Monarch Alert counts. Accordingly, the monarchs were making bigger clusters on the potted eucs and had fanned out to the north and south side of the Eucalyptus grove, where ever windbreaks allowed them to spend the night.

On November 8th, the Sanctuary was sunny, but was hit with some high winds as monarchs numbered over 3,000. Pacelli's observed some interesting movement of monarch clusters onto Monterey pines as the higher winds kicked up:

> "The butterflies no longer can hang on to the potted eucs. . .the trees are too thin, but are working very well as windbreak and their movement is in unison with the existing trees, making it all work. Some butterflies are on oaks, but a lot more monarchs are on Monterey pines as we run out of nonwindy resting spots on existing eucs. The monarchs changed their day resting spots to adjust to the lack of branches and new sunlight patterns."

And on November 9th, high winds in the Sanctuary resulted in a few potted trees being blown over:

> "One of the oaks was blown over. This oak was filled with Monarchs 2 weeks ago, but now the butterflies have moved higher up over the oaks to the eucs to the left and right with some windbreak provided by the oak. This morning no Monarchs were on any of the cluster spots around the tree. Maybe it was from the crash or lack of windbreak? This spot had a huge opening and I put 10 oaks as part of a windbreak that started over the out-buildings and extended 10 feet north. . . to fit the existing eucs. This is the first place the Monarchs come every year and it had the most damage from the cuttings. The first oak I put in was between the building along with some flowers on the roof on the shed, as a welcoming center, worked very well until someone needed to move the flowers. And then someone moved a tree for better viewing, so the Monarchs moved to a potted euc about 10 feet away. The city forester cut that euc down. The next day, butterflies moved about 6 feet to an oak right next door. The monarchs clustered overnight in the hundreds at 6-14 feet off the ground. As the wind and rain came the Monarchs moved higher up."

Further observations on November 18th and December 12th illustrated how changes in the position of the potted trees subsequently alter the locations where monarchs cluster:

> "The trees were moved again in the last 2 days. It changed the wind pattern around an existing tree so it no longer supports the Monarch clusters, but the butterflies just moved over a few feet. . . . [I] moved some oaks back around the shed and the Monarchs are moving back to the existing euc branches in the southwest corner as the windbreak was reformed. "

Interestingly, by November 26th it was becoming evident that there was a lot of movement of monarchs between the Eucalyptus and Monterey pines and the shifts in the wind directions caused the monarchs to pay less attention to the potted oaks.

The winds blowing through the Sanctuary in November demonstrated clear benefits of using potted trees as windbreaks and substrate on which monarchs could cluster. The oaks in particular provided good windbreaks. During days or nights with high winds, at least 1,000 monarchs clustered on trees surrounded by potted oak trees and eucs. Potted trees did their job in locations that would not hold monarchs in 2009-10 due to gaps from tree-trimming.

Monarchs started to move out of the Sanctuary by November 30th, 2010:

> "About 5,000 Monarchs, 75% of which are on the Gomez pines that are supported by the potted trees and existing trees to make one of the last butterfly zones from this time of year. The Monarchs race around the potted eucs and hang out in groups of 5 or less, but flutter in and out of the potted trees. The butterflies on the SW side still have not returned even on a big existing branch that held most of the clusters this time of the year in past years. . . . This SW part of the grove is empty despite the sunlight. After the potted trees were moved for the tenth time, the Monarchs moved on."

By mid-December 2010, few monarchs were flying around in the Sanctuary compared to November. Most monarchs were observed in the Gomez yard, adjacent to and south of the Sanctuary. Pacelli observed that "the monarchs are trying to move back into the Sanctuary – a few brave ones flow over the grove in a lull in the wind."

Storms in mid to late December shook things up for the monarchs at the Sanctuary, but they remained at the Sanctuary and within neighboring yards, unlike 2009-2010 season:

> "After the storms all is fine. Smaller clusters are higher up and all over the place, but still here. The storm came from the south so the monarchs shifted for the night to the north side, where there was a lot of cutting on that side. But it worked out."

The fact that monarchs were clustering on the potted trees, clustering in areas where the potted trees provided windbreaks, and remained or returned to the potted trees in the Sanctuary and in neighboring yards after severe storms collectively indicates that this emergency mitigation effort provided important benefits for overwintering monarchs in Pacific Grove. Weiss (2011) substantiated the windbreak, microclimatic, and habitat complexity benefits that the potted trees provided for monarchs.

Lessons and Recommendations

This paper illuminates the potential for using potted trees to mitigate impacts on monarch habitat.

of natural treasures like monarch butterflies to human communities, the importance of community-based conservation efforts in the face of political resistance, and the importance of the protection and restoration of monarch overwintering sites from a sustainable economic standpoint.

Conservation Options

1. Lessons for local and international community

2. Potted trees provide impetus to expand sanctuary

3. Where will this lead? What else can be done?

4. How to use existing legal mechanisms in PG/CA to promote monarch conservation?

5. Legal framework? Tree ordinance? Room for improvements? Economics?

Discussion

Despite continued efforts to protect monarch habitats from degradation, legal or otherwise, we must occasionally audit our conservation and research efforts to determine exactly how limited resources for monarch conservation can most effectively and efficiently be used. At least one question along this line of thinking must be asked: If monarch habitat remains subject to continued degradation, what is the alternative? Because we cannot always stop habitat degradation, we believe that one important alternative is habitat restoration. The goal of this paper is to examine potential habitat restoration efforts using a case study from Pacific Grove, California's world-renowned Monarch Grove Sanctuary. This paper has four objectives: 1) provide background on the Sanctuary and its importance; 2) provide an overview of the need for emergency restoration efforts at the Sanctuary; 3) describe restoration efforts at the Sanctuary and the benefit of strategically placed potted trees; and 4) provide a set of recommendations for monarch habitat restoration in other overwintering sites in North America. Pacific Grove's monarchs exemplify the importance of locally or globally iconic natural treasures that are part of the fabric of human communities.

Figure Legends

Figure 1.

Figure 2