

Building Climate Resilience of Urban Waters, Ecosystems, and Communities

Biannual Report of Findings from Manzanita Canyon for Local Decision Makers
May 2016 - November 2017

2,248 volunteers helped to remove 290 dumpsters full of trash & weeds over 1.5 years!



104.5 m³ (9.7 mt) of trash & 586.0 m³ (13.6 mt dry weight) of nonnative plants were removed from all of Manzanita Canyon over the past 1.5 years.

- **Kid & adult volunteer time** over the past 1.5 years totaled **6,774 hours**.
- **66% of volunteers** are from the City Heights community.
- **29 organizations** hosted volunteers, including school clubs, nonprofits, companies, community & faith-based groups.

Side canyons have accumulated the most trash over the past 1.5 years

Methods & Results

During Spring & Fall of 2016 and 2017, cleanups were conducted at the head, middle and end of the canyon, and three side canyons (Jamie's Way Spr 2016; Cooper Canyon Fall 2016 & 2017, Spr 2017; Redwood & Central Fall 2017). Meso (≤ 1 m length) and macro (> 1 m) trash were collected, totaled and averaged ($\pm 1SE$) across date. Input is inferred from type and location of trash.

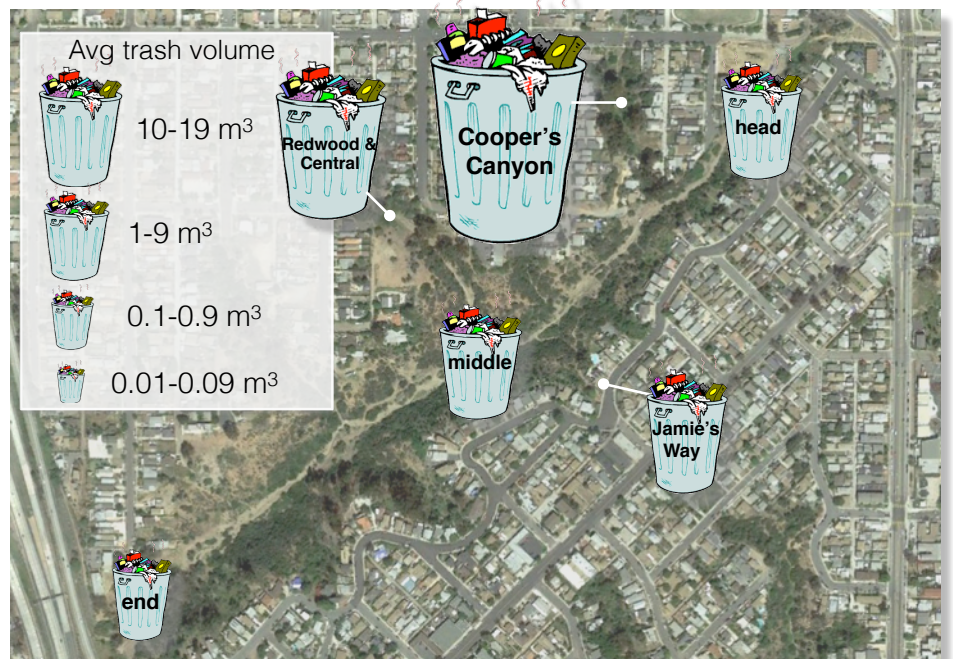
Average trash amounts ranged from 0.02 ± 0.004 m³ / 5.53 ± 2.23 kg at the end of the canyon to 10.52 ± 6.23 m³ / 1059.71 ± 537.05 kg at Cooper Canyon (see figure).

Macro trash included mattresses, bedding, furniture, tires, composite wood, laminate, and cement; **hazardous materials** included feces, syringes and other drug paraphernalia.

54% of meso trash (by volume) found in the main canyon during the four cleanups was **plastic**; **18% was lumber and man-made wood**.

51% of meso plastics (by count) were bags, packaging and wrappers, **13%** were single use food containers, and **19%** were household items like synthetic wipes and bits of electronics.

Trash inputs include storm drains (e.g., head, mid), illegal dumping (head, side canyons), and homeless camps (mid, end, side canyons).



Recommendations

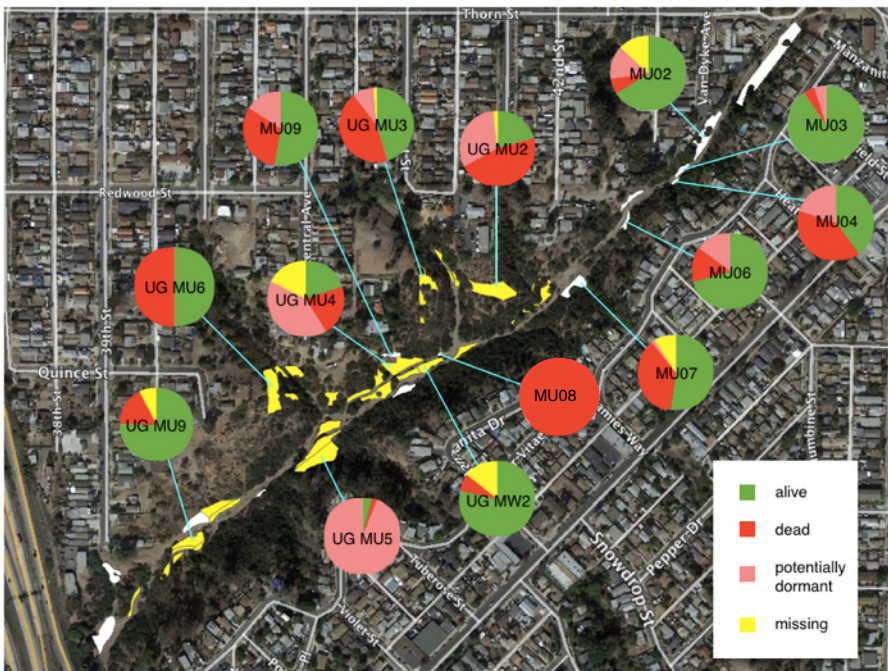
Focus cleanup efforts in areas of illegal dumping and homeless camps (in cooperation with authorities and inhabitants), especially in obscured side canyons. Add effort by storm drains after rains. Prioritize regionally: Most mid-city parks and open spaces are this trashed or more (e.g., Swan Canyon)!

Work with the City to enforce illegal dumping laws, expand large item pickup services and drop-off locations, and improve clean street strategies.

Work with industry and businesses to initiate incentives for reductions or bans of single use bags, packaging, wrappers and food containers/utensils.

Educate and understand the challenges the community faces in stopping illegal dumping, reducing waste, participating in clean ups, and supporting regional strategies to help the homeless.

50% of plants survived their first year in the ground



Methods & Results

Growth and mortality of the 716 natives planted throughout the canyon in winter 2016-17 have been monitored monthly. Proportion per plot of live, dead, potentially dormant, and missing plants as of Nov 2017 are shown here.

Plant status criteria

Dead= plant lacks green foliage & stems

Missing= no stems found after an exhaustive search, likely indicating mortality

Potentially dormant= drought deciduous plant that may be alive despite appearing dead

Dry conditions* have likely contributed to a rise in mortality since spring, but the extent of loss remains unclear as several drought deciduous species may still be dormant (e.g., fuchsia-flowered gooseberry in UG MU 2, 4 & 5).

Trampling & washouts contributed to plant mortality on canyon slopes and side canyons, especially near renegade trails (e.g., MU 04, 07, 08, & 09)

Bunny grazing contributed to mortality of favorite species throughout the canyon (e.g., goldenbush)

Canyon ridges saw high mortality likely due to a mix of dry conditions, clay soils and chosen species— many scrub oak and wart-stem ceanothus died by summer's end.

*Total Sep-Nov rainfall in 2016=30mm, while 2017=1.7 mm

- Since planting, **stem basal diameters of surviving plants grew** on average by **105%**, ranging from -30% for common yarrow to 319% for deerweed.
- **Volume, a proxy for biomass, of surviving plants increased** on average by **6,642%**, ranging from -2% for California buckwheat to 44,304% for Western ragweed.
- Contributing to variable, sometimes negative, growth rates was the loss of stems to natural post-transplant die back, damage from washouts, trampling or grazing, and the subsequent re-sprouting of new, thinner stems.

Plant survival rates are not unreasonable

considering no irrigation system and extremely dry conditions. By comparison, survival in a nearby, irrigated coastal scrub restoration between fall 2015-2016 was 56%¹.

Recommendations

Increase watering during late summer/early fall and into early winter during drought².

Increase erosion control and closure of renegade trails on planted slopes.

Use a planting palette that matches established plant species in areas lacking obvious causes of mortality (e.g., coyote bush, rock rose on canyon ridges).

Keep cones on bunnies' favorite species, especially when conditions are dry and food gets scarce.

More regularly weed in cones during drought to reduce water competition³.

In future efforts, consider & allocate resources for:

Expanding use of mulch to maintain soil moisture and enhance microbial activity conducive to natives^{4,5}.

Planting in diverse clumps in open areas and denuded soils for partial shade, mycorrhizal inoculation and/or stabilization^{6,7}.



Large, dense cuttings from maintenance are used to block renegade trails.

- Over the last 6 months, **558 m of renegade trails have been closed**.
- So far in the 2017-18 planting season, **325 new natives were placed in Manzanita Canyon!**
- **Despite several vandalism events**, all but a few new plants were salvaged and replanted.



Community environmental champions Cindy Lapiro & Matt Armstrong



Drought deciduous fuchsia-flowered gooseberry re-sprouts leaves in fall.

1 Boland and Winter. 2016. Restoration of Disturbed Salt Marsh-Upland Transition in the Tijuana Slough National Wildlife Refuge: Final Report. CDRW EEP P1475039.
 2 Stratton. 2009. www.catalinaconservancy.org/userfiles/files/wildlife/oak_symposium/06-Stratton.pdf
 3 Gordon and Rice. 2000 www.plantsciences.ucdavis.edu/ficelab/Publications/Gordon%20and%20Rice%2004m%20%20%20202000.pdf
 4 Zink and Allen. 1998. DOI: 10.1046/j.1526-100x.1998.00617.x
 5 Talley and Dayton. 2014. Native planting diversity and introduced plant litter influence the development of an urban coastal scrub ecosystem. Unpub MS
 6 Padilla and Pugnaire. 2006. DOI: 10.1890/1540-9295(2006)004[0196:TRONPI]2.0.CO;2
 7 Byers, et al. 2006. https://doi.org/10.1016/j.tree.2006.06.002