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Decreasing Trash in Local Creeks: A Program Evaluation of the City of San Jose's Direct Discharge Trash Control Program

Lakeisha Bryant
San Jose State University

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by

Lakeisha Bryant

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Professor Frances Edwards Ph.D.
Adviser

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BACKGROUND

"Water really is the genesis ingredient for life at all levels—water is so fundamental to everything involved in creating, reproducing, and sustaining life that it is possible to imagine that God created water and let water do the work to create life" (Fishman, 2011, p.44). Water is the world's most precious natural resource. In the United States, there are 25,000 rivers that travel 3.5 million miles through tributaries unique to their landscape (Fritz, 2016). In California, the San Francisco Bay Delta watershed is the largest estuary on the west coasts of North and South America, and stretches 75,000 miles. It is the only inland delta in the world (Environmental Protection Agency, 2022). The watershed is a source of drinking water for nearly 25 million Californians, and it is bounded by the Sierra Mountain Range (Environmental Protection Agency, 2022). Nearly half of the surface water in the region comes from the rain or snow that falls in the watershed and flows downstream to the Pacific Ocean through the Golden Gate Strait (Environmental Protection Agency, 2022).

California's diverse biological landscape brings an array of fish species that carry volumes of nutrients to the state's inland ecosystem (Hanek, pg.20). The San Francisco Bay Area relies on its groundwater basins and surface reservoirs to sustain animal and plant life. The San Francisco Bay Watershed includes the San Francisco Bay, the Sacramento-San Joaquin River Delta, the Sacramento River Watershed, the San Joaquin River Watershed, and the Tulare Lake Basin Watershed. The San Francisco Bay is home to over 7 million people with tributary rivers, creeks, and streams that drain into the bay. Santa Clara County's six watersheds flow to the Bay, and San Jose has 35,000 inlets connected to the bay through a creek or river (Environmental Services Department, Our Creeks, Rivers, and Bay, 2021).

Problem

The entire San Francisco Bay was once a navigable waterway in the 1850s during the Gold Rush era. Large amounts of sediment from upstream erosion and mining flowed to the bay resulting in the downsizing of the bay's square miles (Environmental Protection Agency, 2022). As a result of intense development on the bay shores and adjacent lands, the bay faces several challenges that affect its water quality and threatens aquatic ecosystems. Pesticides, mercury, metals, and pathogens are just a few substances in the bay that cause unhealthy conditions for aquatic life and threaten human health. California's Water Resources Control Board and the San Francisco Bay's Regional Water Quality Control Board collect data on contaminants that degrade water quality and set the standard for mitigating and preventing pollution.

Trash is a major polluter in the San Francisco Bay, and cities and counties are responsible for managing the trash load in their jurisdictions. The City of San Jose manages a comprehensive approach to trash that combines inlet trash capture systems, street sweeping, anti-litter campaigns, a single-use carry-out bag ban ordinance, a foam food container ban ordinance, and trash cleanups in creeks. Trash management in San Jose is a multistep approach to controlling and clearing the tons of accumulated litter and debris left by the inhabitants of homeless encampments, particularly alongside waterways.

At any given time, an average of 350 homeless encampments exist along waterways in San Jose (United States Department of Housing and Urban Development, 2020). San Jose's high cost of living contributes to the growing unhoused population. As a result, homelessness continues to increase, leading to more people living outdoors without sanitation or trash recyclables, resulting in trash accumulation in the creeks. Every year, 7 trillion bits of microplastics flow into the San Francisco Bay, pouring through the Bay Area's 40 sewage

treatment plants (The Mercury News, 2019). While 7 trillion bits of microplastics come through the sewage treatment plants, 300 times more of the bits comes from storm drains that are filled with plastic litter from roads, foam food packaging, rubber from tires, and other sources that deliver debris that then flows from creeks (The Mercury News, 2019). In the 2015-2016 year, the City of San Jose put forth a concerted and collaborative effort to manage trash accumulation in and around creeks, especially the plastic litter created in homeless encampments. This research aims to analyze the response to direct trash discharges into the bay from homeless encampments along creeks.

Clean Water Act

In 1948, the United States Federal Government passed the Federal Water Pollution Control Act, 33 U.S.C. §1251 et seq. (1972) to regulate discharged pollutants into United States waterways and to provide a water quality standard for surface waters (the United States Environmental Protection Agency, 2020). In 1972, the Federal Water Pollution Control Act was reorganized and expanded with a new name, the Clean Water Act (CWA). The purpose of the CWA§101(a) of 1972 was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" by preventing, reducing and eliminating pollution (Environmental Protection Agency, 2022). The CWA was later amended in 1987 to include a section regulating stormwater dischargers and requiring individual control strategies to mitigate non-point source pollution (Environmental Protection Agency, 2021). The Environmental Protection Agency defines non-point source pollution as land runoff from precipitation, atmospheric deposition, drainage, or hydrologic modification (Environmental Protection Agency, 2022). In other words, non-point source pollution comes from the general environment. In contrast, point source pollution is defined as "any discernible, confined and discrete, conveyance, including but not limited to any

pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged" (The Environmental Protection Agency, 2022). While point sources can be measured and controlled, non-point sources require a community-wide approach.

National Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (NPDES) is a federal permit authorized by the CWA, with limits on point source discharges that can pollute waterways in the United States (Environmental Protection Agency, 2022). The CWA prohibits discharging pollutants in waterways unless granted an NPDES permit. The NPDES permit includes monitoring and reporting on the types of discharges to ensure that discharges do not negatively affect water quality and human health. NPDES applicants can apply for a permit through two categories: "general" and "individual." General permits cover multiple facilities and allow the state of California's Water Boards to allocate resources efficiently, as a permit covers several facilities in the same category. General permits cover point source discharges from stormwater runoff and wastewater. Generally, permits are distributed to cities, counties, or state boundaries. Individual permits are issued to individual facilities and are assigned a permit based on the type of activity, the nature of the discharge, and the impact on water quality (California State Water Resources Control Board, 2021). The NPDES permit ensures that a state meets the mandatory requirements for clean water (Environmental Protection Agency, 2022).

In California, the NPDES permit is managed by the California State Water Resources Control Board and its nine regional water control boards. The California State Water Resources Control Board is a five-member board that allocates water rights, adjudicates water rights disputes, and sets the water quality standard for California (California State Water Resources

Control Board, 2022). In 1969, the state enacted the Porter-Cologne Water Quality Control Act to preserve the state's water landscape and to regulate pollution in waterways. In the 1960s, the Porter-Cologne Act became so influential that it laid the foundation for sections of the Federal CWA (California State Water Resources Control Board, 2022).

In 1989, South San Francisco Bay was listed as an impaired waterbody due to its high levels of heavy metals (Santa Clara County, 2021). To preserve water quality and mitigate pollutants in the South San Francisco Bay, the San Francisco Bay Regional Water Quality Control Board enacted the Basin Plan to establish water quality objectives for ground and surface water (California Water Quality Resources Control Board; The Basin Plan, 2022).

NPDES Municipal Stormwater Permit

In Santa Clara County, the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) works toward reducing non-point source pollution from stormwater runoff and additional surface flows (Santa Clara County, 2022). SCVURPPP is a multi-jurisdictional effort between Santa Clara County, the Santa Clara Valley Water District, and 15 municipal agencies that share an NPDES permit. As co-permittees, SCVURPPP undertakes several activities to eliminate illegal discharges into storm drains, including educating the public on controlling non-point source pollution, and instituting local regulatory monitoring efforts (Santa Clara County, 2022).

The San Francisco Bay Regional Water Quality Control Board is regulated under the NPDES Municipal Storm Water Phase 1 Permit, which regulates stormwater discharges from separate municipal stormwater sewer systems for areas serving over 100,000 people (California State Water Resources Control Board, 2022). Phase 1 of the permit requires permittees to implement a stormwater management plan to reduce pollutants entering the stormwater sewer

system. In 2015, the San Francisco Bay Regional Water Quality Control Board issued an updated directive under the NPDES permit, which included new guidelines for mitigating pollution in waterways.

One of the key components of the NPDES permit is its trash load reduction guideline. In section C.10 of the NPDES permit, permittees are required to reduce trash loads by 70% by July 2017, and 100% by July 2022. Permittees must submit an annual report with a summary of trash control actions within each trash management area to show whether they are meeting the NPDES requirements (California State Water Resources Control Board, 2015). Permittees must calculate trash levels in each annual report using an NPDES calculation method. SCVURPP works with the Bay Area Stormwater Management Association to assess trash levels and develops a trash monitoring program under the Municipal Regional Permit (MRP) Provision C.10.b.v of order no. R2-2015-0049.

The San Francisco Bay Regional Water Quality Control Board Region 2 regulates the City of San Jose's efforts to prevent pollution in waterways. In 2014, the City of San Jose submitted a Clean Waterways, Healthy City: Long-Term Trash Load Reduction Plan and Assessment Strategy to address trash issues within its jurisdiction, and to measure trash reduction effectiveness. The City of San Jose submitted the Long-Term Reduction Plan as a requirement of the NPDES permit Phase 1 and the Municipal Regional Permit (MRP). The MRP permits cities, towns, counties, and flood control agencies in the San Francisco Bay Region to participate collectively. Each permittee must submit a trash reduction plan that meets 70% of trash reduction by 2017 and 100% by 2022 (California State Water Resources Control Board, 2021). In addition, to meet NPDES MRP C.10.(c) requirements, permittees must reduce the impacts of trash discharges that are separate from the stormwater system. In partnership with the City of San

Jose, the City of San Jose's Environmental Services Department, Valley Water, and SCVURPPP created the San Jose Direct Discharge Trash Control Program to assist with the NPDES permit provision C.10.(c). requirement.

As part of the Trash Load Reduction Plan, the city identified trash control measures to track progress toward the trash reduction goal, which include creek and shoreline cleanups. The City of San Jose uses the NPDES quantifying formula calculation to track its progress. The quantifying formulas include land trash pickups, enhanced street sweeping, partial-capture treatment devices, full-capture treatment devices, and creek and shoreline cleanups (California State Water Resources Control Board, 2021). This research paper studied section C.10. of the NPDES permit, which requires permittees to report their yearly trash load reduction strategies. Specifically, this research evaluated the City of San Jose's response to managing and removing direct trash discharges into local creeks from the homeless population.

Homelessness in California

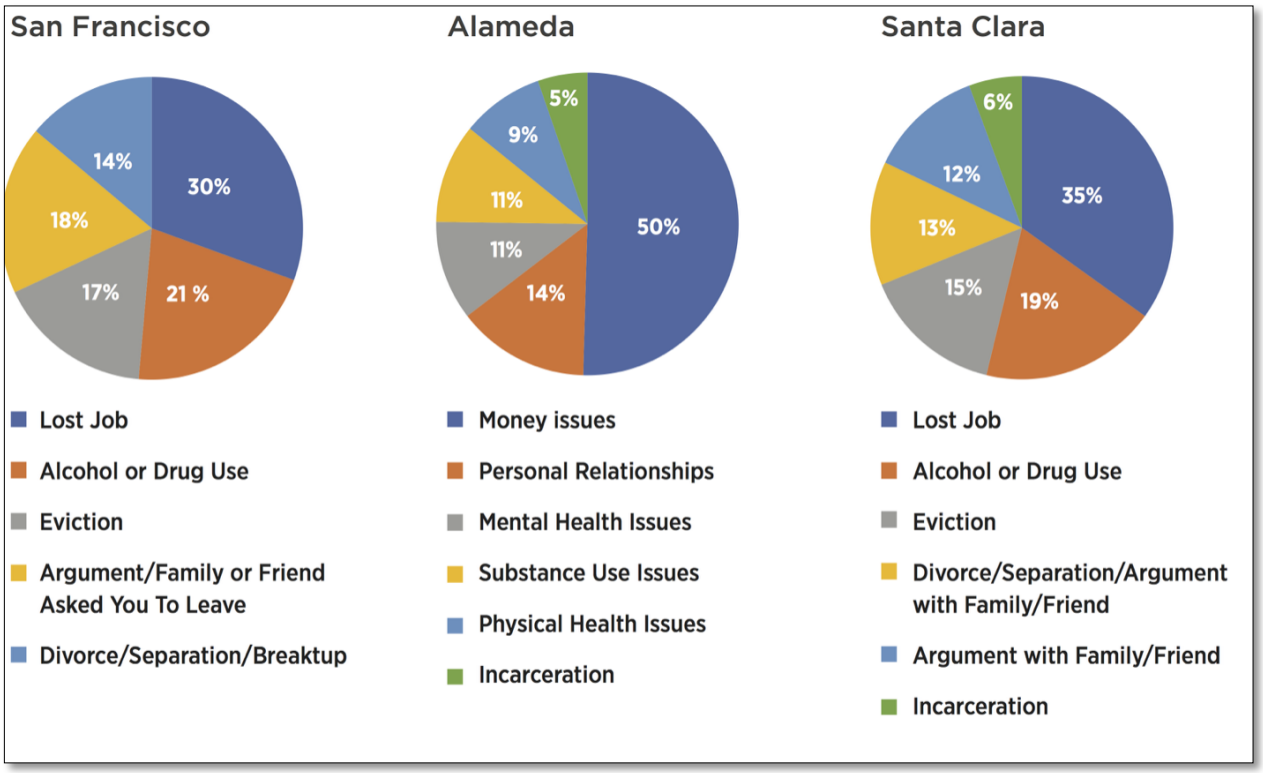
The City of San Jose's Direct Discharge Trash Control Program removes trash in and around creeks from homeless encampments along waterways. The City of San Jose created the program to address the trash accumulation found along creeks and to provide services to homeless individuals. Historically, homelessness in San Jose can be traced to broader systemic policy and economic issues in California and the United States. On any night, 580,466 people in the United States experience homelessness (United States Department of Housing and Urban Development, 2020). California is the number one rated state with the highest number of homeless people at 161,548 of whom 113,660 are unsheltered (United States Department of Housing and Urban Development, 2020).

In Southern California, the most significant downturn of the economy and housing began in the 1970s and 1980s, when the country began deindustrializing, and manufacturing jobs shifted to low-wage service industries (KCET, 2017). KCET radio broadcasted excerpts of a study by Wolch et al. (2007) on homelessness in Los Angeles, the authors found that over three-quarters of new jobs created in the 1980s were minimum wage. By 1983, 15% of Americans lived below the poverty line even though at least one person in the household worked (KCET, 2017). The study found that Los Angeles lost 75,000 manufacturing jobs between the late 1970s and early 1980s. The motion picture and defense-dependent industries plummeted, leaving available mostly low-skill, low-wage jobs. The shift in wage distribution led to increased poverty in Los Angeles County, and the poverty rate grew from 8% to 14% (KCET, 2017). The loss of high-wage jobs in the 1970s changed the economic landscape, and the lack of affordable housing resulted in a rise in homelessness in the decade following 1973 (KCET, 2017).

In comparison, homelessness in the San Francisco Bay area dates to before the Great Depression. Turner (2017) found that in the 1940s, Americans experienced homelessness and poverty, but could find adequate shelter in single-occupancy hotels. Turner (2017) believed that there was once a time when addressing homelessness was manageable. However, pitfalls in public policy, federal spending, economic shifts, and criminal justice policies exacerbated the economic plight of vulnerable citizens. Turner (2017) found similar homelessness trends as found in the Wolch et al. (2007) study of Los Angeles. Turner (2017) attributes homelessness to several factors, including economic dislocation in the 1970s and the economic recession of 2008. California's inability to build enough housing for the growing population and federal cuts to affordable housing played roles in the increase of homelessness in San Francisco. In the San Francisco Bay area, Turner (2017) stated several additional contributing factors to homelessness,

including mass incarceration and the inability to obtain employment. Furthermore, the lack of very low-income housing, and the large number of families qualifying to obtain the available low-income housing further limited access. In addition, in the 1980s the state closed the mental hospitals, resulting in reduced safety nets for people experiencing mental illness. Finally, Turner (2017) summarized the reported causes of homelessness in the bay area in the chart below.

Figure 1: Reported reasons for homelessness in the three largest Bay Area counties



Source: Turner, 2017, n.p

Between the years of 2017 to 2020, the bay area's homeless population accounted for more than a quarter of the growth in the total U.S. homeless population, according to a homelessness study by the Bay Area Council Economic Institute (2021). The bay area reported an estimate of 35,118 homeless individuals in 2020, which is the third highest of any region in the U.S. following New York City and Los Angelos (Bay Area Council Economic Institute's Excutive Summary, 2021). The study found that homelessness is directly tied to the housing shortage as the bay area created

531,400 new jobs but approved only 123,801 new units between 2011 and 2017. The Bay Council Economic Institute (2021) found that the ratio between jobs created and the number of housing units built resulted in a competitive housing market and inflation. Moreover, between 2012-2017, the bay areas affordable housing units for housholds earning below 100% of area median income declined by 24%. The region lost 5,000 units of affordable housing for housholds earning below 30% of the area median income (Bay Area Council Economic Institute Executive Summary, 2021). Construction costs for affordable housing also impacts the regions ability to house the homeless. In 2018, the average price to build an affordable unit in the bay area was $529,000 dollars (Bay Area Council Economic Institute, 2021).

High-tech income earners in the bay area contribute to the large income inequality and the decline of the middle class. Researcher Cassandra Stumer (2013), studied Silicon Valley's influence on the super gentrification of San Francisco. Stumer (2013) argued the differences between gentrification and super gentrification which is when gentrified neighborhoods that were once upper middle class turns into exclusive and expensive enclaves due to wealthier residents purchasing properties. Stumer (2013) argued that the "pricing out" of residents from their neighborhood was due to to the geographic proximity of global financial centers – like the Silicon Vallley. Stumer found that tech workers in the Silicon Valley were the highest paid in the country and most commutted from where they worked in Silicon Valley to San Francisco. In addition, the extremly wealthy tech workers transformed the urban landscape which made upper and middle class residents priced out of the super wealthy enclaves (Stumer, 2013). The high cost of living and the decline of middle-income jobs, due to globalization of the workforce, forced middle class housholds to move out of bay area neighborhoods (Willon, 2015). According to Jobs with Justice, a non-profit organization that fights for worker's rights, found in 2015, that

nine outsourcing companies that receive the largest numbers of H-1B work visas nationally made up one-fifth of the Silicon Valley's nearly 140,000 H-1B work visas which included subcontracters and offshoring jobs (Jobs with Justice, 2016). As a result, the bay area has the greatest loss of middle income housholds in the country ranging from $35,000 to $150,000 (Willon, 2015).

Homelessness in San Jose

San Jose is the tenth-largest City in the United States and the third-largest City in California, with a population of roughly 1 million people (United States Census, 2021). Incorporated in 1850, San Jose lies in Santa Clara Valley and sits along Coyote Creek, Guadalupe River and its tributaries. It is approximately 178 square miles and 50 miles from San Francisco. San Jose is located in Santa Clara County, which has six watersheds. Coyote Watershed is the largest and expands 332 square miles, and provides drinking water to 270,000 residents and businesses. The Coyote Watershed extends from the urbanized valley floor to the Mount Hamilton Range (South Bay Creeks Coalition, n.d.). Guadalupe Watershed is also in Santa Clara County, and it expands 170 miles through the cities of San Jose, Los Gatos, Monte Sereno, Campbell, and Santa Clara (South Bay Creeks Coalition, n.d.). Santa Clara County's creeks and rivers catch rain and runoff from storm drains and carry the water north to San Francisco Bay or south to Monterey Bay (Santa Clara Valley Water District Watersheds, 2021). Santa Clara County was once known as the "Valley of Hearts Delight" because of the fruit orchards and agricultural landscape (National Museum of American History, n.d.). In the 1960s, the area became the center of computer chipmakers, which led to the development of personal computers (National Museum of American History, n.d.). The name "Silicon Valley" was coined in 1971 by journalist Don Hoefler from the silicon wafers used in the semiconductor industry (National Museum of

American History, n.d.). By the 1990s, Silicon Valley was known for inventing the personal computer and commercializing internet technology (Zhang, 2003).

Between the 1960s and 2000s, San Jose annexed adjacent territory, tripling its land mass and quadrupling its population. By the 2000s, San Jose's population grew from roughly 200,000 residents in the 1960s to 900,000 (Bay Area Census, n.d.). As stated above, the San Francisco Bay area has the highest paid tech workers in the country and wealthy homebuyers drives competition. The average price of a home in California is nearly $500,000, and in San Jose, the average price of a home doubles at nearly $1,000,000.

Due to the high cost of housing and the contributing factors to homelessness discussed above, San Jose has a large population of homeless individuals, many of whom reside along creeks and rivers. A 2019 San Jose point-in-time homeless survey found that that were 6,097 people experiencing homelessness in San Jose, which was a 40 percent increase from 2017 and the highest number in the last 15 years (San José Homeless Census and Survey Report, 2019). The 2019 Homeless report found it difficult to pinpoint an individual's inability to obtain or retain housing in San Jose. However, the survey – which was based on self-reports by homeless people who were interviewed - found that 30% were homeless because they lost their jobs, 25% stated alcohol or drug use, 16% stated divorce or separation, and 13% stated eviction (San José Homeless Census and Survey Report, 2019). In the 2019 survey, causes of homelessness included 68% of individuals citing not being able to afford rent, 60% stating that they did not receive enough income, and 47% cited a lack of housing options (Homeless Census & Survey Report, 2019).

The City of San Jose found that 38% of surveyed respondents lived outdoors, in parks, or encampments, compared to 21% living in emergency or transitional housing. Seventeen percent

of those surveyed lived in a structured area not used for sleeping, or in a vehicle. Lastly, 7% lived in a motel/hotel. In 2015, the organization Destination Home studied the cost of homelessness in Silicon Valley between 2007 and 2012 (Home Not Found, 2015). Flaming et al. (2015) obtained information on 104,206 individuals who were homeless during the six year period, that included their demographics, medical history, judicial history, and the costs associated with each service. The study showed that the Santa Clara County community spent $520 million a year providing services for the homeless during the six year period covered by the study (Home Not Found, 2015). Concurrently, there are 2,800 chronically homeless individuals with an average yearly public cost of $83,000 each. Flaming et al. (2015) recommended prioritizing housing opportunities for chronically homeless individuals to save or offset the overall housing costs.

When chronic homelessness persists, it adversely causes a cyclical effect, and large creek encampments appear around San Jose. San Jose was once the home to the largest creek encampment in the country, known as The Jungle. The Jungle, or Coyote Meadow, was 75 acres of tents, shacks, tree houses, and makeshift dwellings along Coyote Creek. Three hundred people lived in The Jungle, some of whom lived along Coyote Creek for several years. In 2012, the City of San Jose evicted 150 people from the area, but unfortunately, the area became reinhabited soon after that. In 2014, the City of San Jose removed residents for a second time as the area became unsanitary and heavily polluted Coyote Creek (Allen-Price, 2014).

The Lawsuit by The San Francisco Baykeeper

In 2014, San Francisco Baykeeper, a non-profit organization that aims to protect and preserve the San Francisco Bay, found high levels of trash and bacteria in San Jose's stormwater runoff. The investigation revealed large amounts of trash and dangerous levels of fecal bacteria

from Guadalupe River and Coyote Creek (San Francisco Bay Keeper, 2014). In February 2015, San Francisco Baykeeper filed a lawsuit against the City of San Jose, alleging that the city violated the Clean Water Act under the Municipal Separate Storm Water Sewer System (MS4) Permit. The lawsuit alleged that the City of San Jose was uncompliant with trash reduction requirements and that there were discharge violations of sewage that infiltrated into the Municipal Separate Storm Water Sewer System. The City of San Jose agreed to continue following the stormwater permit and additional requirements to significantly reduce Polychlorinated Biphenyls (PCB'S), mercury, and fecal bacteria. The City of San Jose agreed to the installation of full trash capture systems and additional creek cleanups.

Furthermore, the City of San Jose agreed to install more green infrastructure and repair 65 miles of high-risk sanitary system pipes. In addition, the City of San Jose agreed to pay Baykeeper $100,000 over 10 years to provide oversight on the city's goals. The City of San Jose was also required to pay Baykeeper $1,000,000 over 5 years for environmental mitigation to improve water quality in Guadalupe and Coyote Creek (Doyle, 2016).

Since the settlement in 2016, the City of San Jose initiated many programs to address trash disposal in the city and its waterways. In 2017, the City of San Jose launched BeautifySJ, an initiative to clean up neighborhoods and public spaces in San Jose through volunteerism (City of San Jose BeautifySJ, 2022). The City of San Jose implemented the San Jose Bridge program, which hires homeless individuals to clean and beautify the city. In 2020, the program serviced over 70 locations, collected roughly 8,000 trash bags, and removed 155 tons of trash from sidewalks and streets (City of San Jose Office of Mayor Sam Liccardo, 2021). The San Jose "cash for trash" program incentivizes unhoused residents to pick up trash at encampments in

exchange for reloadable cash cards from Mastercard (City of San Jose Office of Mayor Sam Liccardo, 2022).

Along with the City of San Jose's efforts, counties across California participate in Coastal Cleanup Day, which is held on the third Saturday of September, and brings volunteers together to remove trash from marine areas. In 2021, more than 26,000 volunteers participated and removed more than 300,000 pounds of trash from beaches (California Coastal Cleanup Day, 2021). National River Cleanup Day is held every year on the third Saturday in May. In partnership with Valley Water, Santa Clara County Parks, and the City of San Jose, the county's volunteers remove thousands of pounds of trash each year from creeks, rivers, and lakes (Clean a Creek, 2021).

Trash in Waterways

The trash in waterways and oceans directly affects the ecosystem and human health. Debris alters physical habitats when trash accumulates on beaches and at the bottom of rivers and oceans. When debris accumulates, it depletes the oxygen levels and undermines the ability of open water to support aquatic life (Environmental Protection Agency, 2021). As benthic habitats- the bottom of a body of water - for aquatic life decline, it leads to aquatic species without shelter and the inability to forage for food. Chemicals transferred to waterways and plastic accumulation resistant to degradation cause high toxicity levels. Studies show that marine plastic debris accumulating contaminants greater than the surrounding environment could potentially harm the food chain (Environmental Protection Agency , 2021). Aquatic plastics found in rivers adversely affect at least 267 species globally, with the most common threat being ingestion and entanglement (Environmental Protection Agency , 2021). The trash in waterways affects the

lives of mammals, birds, fish, and turtles, and it interferes with humans' health, recreation, and tourism (California State Water Resources Control Board , 2015).

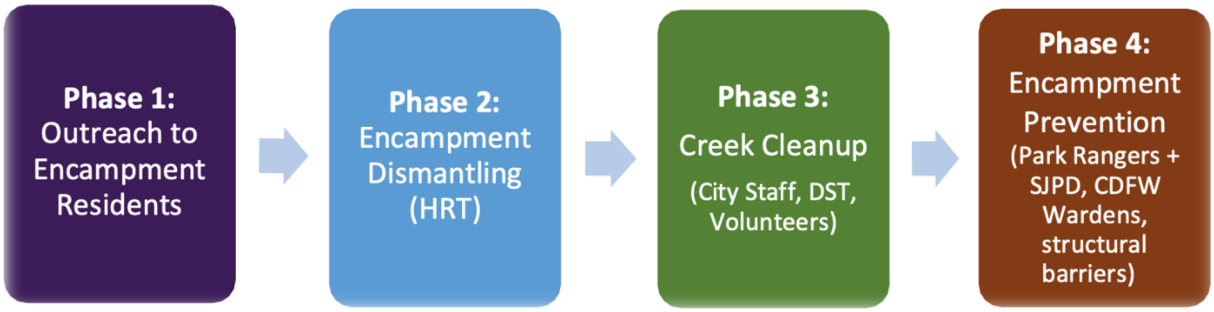
The San Jose Solution

In 2014, the City of San Jose submitted the "Clean Waterways, Healthy City: Long-Term Load Reduction Plan and Assessment Strategy" in compliance with the NPDES provision C.10.c of the Municipal Regional Stormwater permit. The plan outlined the city's effort to effectively manage and minimize trash impacts in receiving waters from the municipal stormwater sewer systems (MS4) (Fukada, 2016). The long-term plan included a strategy to install additional hydrodynamic separators, which are underground trash and grit devices, to meet the mandatory trash reduction targets set by the State Water Resources Control Board. City of San Jose staff found that 63% of trash hotspots in the area were associated with homeless encampments and encampments were the number one source of trash in trash hot spots along Guadalupe River and Coyote Creek.

The regional NPDES permit, in 2015, was amended to include a trash reduction offset for cities and counties dealing with the unhoused. The amendment included a calculation for trash reduction encampment cleanups and as a result, the City of San Jose submitted a comprehensive encampment cleanup and outreach service plan to include in their annual stormwater management report. From 2016 on, the City of San Jose planned to include an offset credit for creek cleanups in their stormwater report. The annual stormwater report includes a 10% trash reduction offset for cleanups coordinated by local non-profit organizations and a 15% reduction for cleanups coordinated by City staff. The Direct Discharge Trash Control Program is a comprehensive response and prevention program to address trash along creeks and provide outreach services for the unhoused.

The Direct Discharge Trash Control program is a continuation of a five-year project (2011-2016) called "Clean Creeks, Healthy Communities" aimed at preventing trash from entering Coyote Creek due to littering, illegal dumping, and homeless encampments (Fakuda, 2016). The program is an interdepartmental and multiagency partnership between the City of San Jose's Housing Department, Environmental Services, Parks, Recreation, and Neighborhood Services, and the San Jose Police Department. The City of San Jose also partners with the Santa Clara Valley Water District (Valley Water) and the California Department of Fish and Wildlife (CDFW). The City of San Jose also partners with the Downtown Streets Team, Keep Coyote Creek Beautiful, and the South Bay Creeks Coalition. The program works in four phases:

Figure 2: Direct Discharge Trash Control Program Phases



Source: City of San Jose Stormwater Annual Report, 2019, A-78

- Phase 1 - Outreach to Encampment Residents: The City of San Jose contracts with HomeFirst and People Assisting the Homeless (PATH) to conduct outreach to homeless individuals to offer alternative housing opportunities.
- Phase 2 – Encampment Dismantling: The Homeless Response Team removes debris from Homeless Encampments and clears the site from ongoing encampments.

- Phase 3 – Creek Cleanup: Volunteers, contracted organizations, and city staff remove any remaining debris from phase 2 and assess the area to see if any structural barriers can be created to avoid future encampments.
- Phase 4 – Encampment Prevention: San Jose Police Officers and San Jose Park rangers patrol waterways and may install structural barriers. Downtown Streets Team will clean and revitalize the area to a "maintenance level" to help the habitat recover.

Source: City of San Jose Stormwater Annual Report, 2019, A-78

During Phase 1 of the program, contracted outreach workers work towards establishing relationships with the homeless with the goal of reffering them to services after performing a Vulnerability Index Service Priortization Decision Assitance Tool or a VI-SPDAT. After a homeless person or a homeless family completes a VI-SPDAT, they can be reffered to housing resources. The City of San Jose offers interim housing through tiny home communities. As a solution to prevent re-encampment, in 2018, the City of San Jose approved two bridge housing communities in partnership with HomeFirst. HomeFirst is the service provider that manages the bridge housing communities and conducts outreach during Phase 1 of the program (HomeFirst, n.d.).

To date, San Jose has five interim housing communities (City of San Jose Housing Department, 2021). Three out of the five are emergency interim housing communities, which are bridge communities that were created as an emergency response to stop the spread of COVID-19 and to allow homeless individuals to shelter-in-place. The emergency interim housing infrastructure is slightly different than the bridge housing communities in such that it is designed to house medically vulnerable homeless resides who are at risk of severe illness or death if contracted with COVID-19 (City of San Jose Department of Housing, 2021). The Emergency

Interim Housing was funded by a reallocation of over $17,000,000 in restricted state funding that was allocated for sheltering and supporting homelessness in the city (City of San Jose Housing Department, n.d.). The reallocation of funds was a direct response to the Governor of California's executive order N-32-20, which urged governments to bring unsheltered homeless individuals indoors during the pandemic. The Governor authorized $500,000,000 in immediate funding to support the health and safety of the homeless population (City of San Jose Housing Department, n.d.) As the risk of COVID-19 declines, emergency interim housing will be a short-term transitional shelter for the homeless until a permanent placement in a affordable housing unit is available (City of San Jose Housing Department, n.d.). Bridge housing community partcipants enter the program through a few different referral processes. A participant can be reffered to interim housing through the rapid rehousing program, which is a time-limited rental assistance and services program. Partcipants can also be reffered through an emergency referral or through having a completed VI-SPDAT. Bridge housing communities are single sleeping cabins with community spaces for showering, using the restroom, dining, laundry, trash services, workshops, and parking (HomeFirst, n.d.). There are staff onsite 24/7 with an security officer. Residents are required to check in and out with the administrative office when entering and exiting the property. Interested participants cannot have a prior 290 conviction and must have a planned goal to seek permanent shelter in the future. The bridge communities are pet-friendly and includes a vegetable and fruit garden (HomeFirst, n.d.).

During the 2020 shelter-in-place due to the COVID-19 pandemic, the City of San Jose faced challenges with implementation of the above phased model approach. The City of San Jose suspended most of its abatement services to prevent the spread of COVID-19 and followed public health orders of social distancing meaures in shelters and providing access to hygiene

supplies. Since March of 2020, the program has been operating as an emergency response to the pandemic and implemented other existing programs in its phased model approach such as the BeautifySJ Initiative (City of San Jose Stormwater report, 2019-2020). The BeautifySJ initiative has been providing hygiene services to the homeless such as portable toilets and handwashing stations. Due to the disruption and slight changes to the program, this research focused on creek cleanups since the inception of the program and before the pandemic. This paper intends to answer the following research questions:

Research Question 1

- Has the presence of the unhoused along creeks and water courses hindered the City of San Jose from mitigating direct trash discharges into the San Francisco Bay?

Research Question 2

- Has implementation of the Direct Discharge Trash Control Program kept the City of San Jose in compliance with the NPDES regional stormwater permit?

LITERATURE REVIEW

Encampment Living Along Waterways

There are many studies on the effects of point source and non-point source pollution in waterways and their impact on the environment and public health. There is limited research on the impact of encampment living along waterways and its direct impact on the environment and public health. White (2013) examined the environmental impacts of homelessness in the riparian zone of San Jose's Guadalupe River and Los Gatos Creek. White (2013) sought to find the types and volumes of trash that were directly attributed to the homeless population. Over ten months, she sampled four areas to see if trash volumes and the type of trash had environmental impacts

on the marine environment. She also sought to find out whether there was evidence of visible alterations to the riparian zones, and if so, what they were.

Based on previous scientific studies of trash in similar soil types and brackish water, like the water found in the San Francisco Bay, inferences and conclusions were drawn on trash along the Guadalupe River and Los Gatos Creek. White (2013) used the Santa Clara Valley Urban Runoff Pollution Prevention Program Rapid Trash Assessment to estimate the volume of trash for sampling. The study sampled three stretches of the Guadalupe River and one area along Los Gatos Creek. Each stretch sampled was categorized by the level of usage by the homeless population. White (2013) observed and recorded incidences of streambank alterations, destruction of vegetation, trail building, fire building, evidence of wildfire, and the number of homeless encampments in the same areas. The study found that incidences of streambank alterations, wildfires, and volumes of trash were more present in areas heavily occupied by the homeless. The study also found that additional locations outside the studied areas were impacted by trash and sediment from the riparian zone that eventually traveled to the marine environment. Based on the study's findings, a few conclusions drawn found that the presence of litter in brackish mudflats can harm the foraging behaviors of intertidal gastropods. The study also found that large bulky anthropogenic materials, such as vehicle tires, could impede the establishment and growth of wetland plants.

Gandara (2020) studied the potential environmental impacts along the Santa Ana River with over 1,000 homeless individuals living along the river. Santa Ana River is 96 miles long and spans parts of San Bernardino, Riverside, and Orange counties (Water Education Foundation, n.d.). Gandara (2020) interviewed watershed experts to identify policy and management's role in government agencies' response to homelessness and how other

jurisdictions address homelessness in their waterways. She discussed the challenges to removing encampments based on federal regulations in the 1972 Clean Water Act. If the removal of an encampment will require large equipment or alterations to the environment, a permit is required to perform an abatement (Gandara, 2013). Gandara (2013) provided successful programs in other cities addressing homelessness and water quality.

One successful program cited in Gandara's (2013) research was the City of San Diego's collaborative efforts with city, county, and federal representatives and private homeowners to combat homelessness. The City of San Diego created a San Diego River Trash mapping tool to inform the public about trash and cleanup efforts along the San Diego River. San Diego also formed partnerships with the San Diego River Park Foundation and the San Diego Regional Water Quality Control Board to expand support for cleanup efforts. With the city's partnerships, San Diego claimed a 90% reduction in homeless encampments along the San Diego River (Gandara, 2013).

Other successful cleanup efforts cited by Gandara (2020 were the Russian River Clean Camp and Education Program and the City of San Jose's Trash Cleanup Pilot Program to clean The Jungle, which resulted in the Direct Discharge Trash Control Program.

Finally, Gandara (2020) suggested recommendations for policymakers, agencies, and public servants on how to improve addressing homelessness along the Santa Ana River, such as sharing data with other agencies, identifying and discussing regulatory constraints on encampment cleanups, a reconsideration of law enforcement as the initial service provider to homeless encampments, removing barriers to shelter and aid, using collective political power for effective change, evaluating restoration, and mitigation strategies along the Santa Ana River.

Blood et al. (2021) studied trash and homeless encampments along Compton Creek in Los Angeles. Blood et al. (2021) created a survey for community residents to report trash along the creek and to use as a resource for creek cleanup. The data for the study categorized types of trash and trash points (single pieces of trash) or trash polygons (large areas of trash). Homeless encampments, creek entryways, and the number of trash cans were collected using existing geocoded locations. Blood et al. (2021) found that most items of trash found along Compton Creek were household items, and the second most common items was recyclables. The study found that trash hotspots and homeless encampments were in different locations and may have resulted from people who lived in private property areas. The result of the study also showed homeless encampments located in secluded areas such as industrial, commercial, and high overpass areas. The study also found trash density in different locations than homeless encampments.

City Programs and Policies that Mitigate Trash along Waterways

Doerschlag (2021) examined trash removal programs in different-sized cities in California. Her research provided an overview of city programs that address homeless encampments along riparian corridors, their effect on water quality, and policy implementation gaps. Doerschlag studied three different sized cities, <50,000 - >100,000), small, medium, and large. Sacramento was the largest city, with a population of roughly 500,000 people over 97.92 square miles of land and an average of 5,570 people unhoused each night. The medium-sized city in the study was the City of Santa Cruz. Santa Cruz has roughly 64,522 residents and 2,167 people experiencing homelessness each night. The smallest city in the study was the City of San Pablo, with a population of 30,697, and 2,277 people experiencing homelessness each night. Doerschlag's (2021) research showed that in Sacramento, as in other U.S. cities, homeless encampments were

situated near services that were adjacent to the American River Parkway. Doerschlag (2021) found that the city of Sacramento did not have a program that directly addressed homeless encampments along the American and Sacramento Rivers. However, the American River Parkway Foundation organized trash cleanups and a Mile Stewards program where individuals could "adopt" parts of the parkway. Individuals who adopted the river were responsible for maintenance and trash removal for two years. She also found that in 2020, Sacramento passed a law banning people from setting up tents within 25 feet of infrastructure outside public buildings, including bridges and levees. The ban was in response to multiple fires and digging into levee infrastructure. Following the ban and the 2020 COVID-19 pandemic, the *Martin vs. Boise* decision by the U.S. Court of Appeals Ninth Circuit ruled that cities cannot enforce anti-camping ordinances unless they have adequate homeless shelter beds available. The city of Sacramento gave fines for littering and tying ropes to trees. Deorschlag (2021) found that repeated ticketing could have pushed people to be covert about where they disposed of their trash and where they set up their encampment. As a result, pollution hotspots and trash cleanups were missed by volunteer organizations and city employees (Deorschlag, 2021

In Santa Cruz, the city had six shelters and one sanctioned encampment that housed anywhere between 475 to 700 people. The sanctioned encampment was located along the San Lorenzo River and managed by the city, the county, and the residents. The sanctioned encampment residents and employee staff worked together to ensure fewer fire risks and pollution along the San Lorenzo River (Deorschlag, 2021). Doerschlag (2021) also found that many programs in Santa Cruz focused on homelessness prevention, and temporary and permanent housing. However, few programs focused on encampments and their effect on water

quality. Deorschlag (2021) found that Santa Cruz had a Downtown Streets Team chapter that worked with low-income residents to remove trash for a stipend.

Deorschlag (2021) also researched the city of San Pablo's programs for preventing homeless encampments along Wildcat and San Pablo creeks. In collaboration with the city of Richmond, the city of San Pablo piloted a Path to Assist the Transition from Homelessness (PATH) program to understand homelessness in San Pablo. The program created a heat map to show the locations of homeless encampments and provided outreach services. As a result of the PATH pilot program, the city of San Pablo expanded its policies and procedures for removing encampments along the riparian corridor and established a Coordinated Outreach, Referral & Engagement Team (CORE). The city of San Pablo also established a waste removal taskforce. Deorschlag's (2021) research revealed the importance of employment assistance, low-income housing, mental health, and social services for homeless individuals to prevent encampment living along riparian corridors to improve water quality.

Gomez (2019) studied the City of Sacramento's efforts in addressing the environmental risks associated with homeless encampments and identified successful programs by other cities. Gomez (2019) used a Criteria Alternative Matrix (C.A.M.) to assess outside agencies' approaches to addressing homelessness and its environmental risks, and included individual interviews with employees within each organization. Gomez (2019) used Bardach's (2019) *Eightfold Path to More Effective Problem Solving*, which includes a criterion for alternative problem-solving methods. Gomez (2019) rated each program based on its cost, equity, implementation viability, and political acceptability. The cost was evaluated by whether a program was fiscally feasible to initiate a program based on the available resources. Equity was evaluated based on the social welfare and equitable implementation (Gomez, 2019). Equitable

implementation was weighted based on if the alternative method stayed within individuals constitutional rights (Gomez, 2019). Implementation viability was evaluated based on the difficulty with executing the program, and political acceptability was evaluated based on decision-makers' support. In the study, cost and equity had a weighted score of 35%. Implementation viability had a weighted score of 20% and political acceptability scored 10%. Gomez (2019) then used a raw score ranging from 1 to 5, 1 being the lowest, which does not satisfy the problem-solving criteria, and 5 being the highest, with the program completely satisfying the criteria.

The first program evaluated in Gomez's (2019) study was Albuquerque, New Mexico's "There is a Better Way" program, which scored a weighted total of 4.35 on the C.A.M. matrix. Equity scored the highest because the program allowed the homeless population to gain work experience, earn a paycheck, and receive a night of shelter. The second program evaluated was the city of Redding's "Community Clean Up Program," which was a collaboration with Shasta County and the City of Redding's police department, that took county jail inmates and transported them to vacant homeless encampment sites to clean up leftover debris (Gomez, 2019). The program worked with the Environmental Crimes Unit to identify vacant homeless encampments and responded to reports of illegal dumping (Gomez, 2019). On average, the program reported removing 26,000 pounds of trash monthly (Gomez, 2019). Cost scored the highest weighted score in the study's CAM matrix because the cost to implement the program would be relatively low due to the wages of inmates in California compared to hiring a full-time city staff worker. The third program evaluated was the city of Austin, Texas's "Revenue Clean Up Fee" program, which charged residents a trash cleanup fee for removing trash in public urban spaces. Residents are charged $8.05 dollars, which generates roughly $2,000,000 dollars for the

city of Austin. The "Revenue Clean Up Fee" program scored the highest in the cost category, and the overall weighted score was 2.35. Gomez (2019) discussed how a fee for residents would take the funding source away from city agencies and potentially benefit Sacramento County.

The last program included in Gomez's (2019) study was the City of Fremont's "Direct Discharge Trash Control Program," which received the highest score in its equity category because of the multi-agency and phased approach to addressing homelessness. This program successfully identified homeless encampments, implemented outreach, trash removal, encampment abatements, put in place preventative measures to avoid re-encampment. The overall weighted score for Fremont's program was 2.7.

Based on Gomez's research, the "There is a Better Way" program from New Mexico was the best overall program because it scored equally across all categories: cost, implementation, and political acceptance. Gomez (2019) concluded the study by stating that the common theme indicated by all interview representatives was the need for better interagency collaboration.

A study conducted on the Jordan River Parkway in Salt Lake City, Utah, examined the complexities of mitigating unsheltered homelessness using an interagency approach. Neild and Rose (2018) studied the role strategies in managing the unsheltered homeless by conducting one-on-one interviews with park managers, housed park users, the homeless, park users, and park residents who were experiencing homelessness. The in-depth interviews were categorized using a combined thematic analysis from authors Boyatzis' (1998) and Crabtree and Miller's (1999) inductive and deductive approaches. Based on the research questions, authors Nield and Rose (2018) formed deductive themes of perceived social and environmental impacts of park residents, mitigation strategies, strategies that hindered resolutions of unsheltered homelessness, and the role of public education awareness in improving collaborative efforts. The study's

findings categorized the data into six dominant themes with specific subthemes. The six themes were perceived environmental impacts, perceived social impacts, mitigation strategies used, barriers mitigation placed on social service providers, barriers mitigations played on park residents, and the opportunity to address unsheltered homelessness in the park through public education (Nield & Rose, 2018).

Nield and Rose (2018) found that the environmental impacts along the Jordan River Parkway included a variety of "waste" ranging from litter, clothing, e-waste, and human feces. Waste along the riparian corridors negatively affects soil, air, and water quality and results in park users having a negative view of the park. Mitigation strategies used included the removal of vegetation along the park and park infrastructure. Park managers collaborated with community organizations to enforce camping ordinances, discarded park resident belongings, placated public complaints, and changed the infrastructure to prevent future inhabitants. As a result, Neild and Rose (2018) found success in the mitigation strategies, but due to limited resources for permanent solutions, vegetation removal was short-term. Once the vegetation grows back, it will provide shelter again for future habitation. Additionally, mitigation strategies discouraged the resolution of unsheltered homelessness. The study found that most unsheltered dwellers along the Jordan River Park survived on roughly $11.00 dollars a day, and they found it difficult to replace belongings that had been discarded during a cleanup. The displacement of park residents pushed many residents further south along the river, away from downtown services, and created barriers for social service providers. Lastly, Jordan River Parkway managers believed that public education on homelessness may have helped to ease the public perception of park residents and irrational fear of people who are different. Park managers emphasized homeless camps as a

cyclical problem; once society accepts homelessness, resources can be shifted into more impactful programs.

The Unhoused and Housed Perspective

In San Diego, CA, researchers Flanigan and Welsh (2020) studied the unmet needs of people experiencing homelessness along the San Diego River. Their research sought to identify the specific health and human service needs of the unsheltered, and how conflicting systems cause their needs to be unmet. Flanagan and Welsh (2020) drew upon larger questions and answers provided by 84 individuals who lived along the San Diego River. Flanagan and Welsh (2020) generated interview questions on high levels of fecal contamination and sanitation practices of people living along the riverbed in homeless encampments, their potential impact on water quality, and identified practical solutions to ameliorate fecal contamination and other environmental impacts. Flanigan and Welsh (2020) sought to find out why homeless individuals live along waterways and their sanitation survival practices. Flanigan and Welsh's (2020) research found that some systems further marginalized the homeless population by criminalizing individuals, making it harder to access other social services. The researchers also found that there were multiple reasons homeless individuals chose to live near the San Diego River, including public health displacement due to the Hepatitis A outbreak and the need to avoid emergency shelters. Living near the river provides access to drinking water, opportunities for fishing, washing, cooking, shade, and a peaceful, calming environment. Living along waterways also provides privacy from public view and safety.

Flanigan and Welsh's (2020) study included 84 interview participants; over half were males, and a little over a quarter were females, including a small portion identifying as a

different gender. Sixty percent of interviewees were white, 19% were Black/African American, 12% Hispanic/Latinx, 9.5% multiracial, and 1.2% were Asian Pacific Islander and Native American. The mean age was 44.8 years, and the mean length of homelessness was 9.6 years. The percentages in the study do not equal one hundred due to the mobility of homeless individuals residing in various places. For example, 81% of interviewees were unsheltered, 63% resided along the riverbed, 16% in canyons, 11% lived in their vehicle, 3.5% lived in an emergency shelter, and 14% lived someplace else.

The study's results focused on a variety of social services and hygiene practices of the homeless, and compared individuals living along the San Diego River to those who did not. The overall rates of accessible services and social service interactions between outreach workers and homeless individuals were low. Less than a third of participants interacted with a homeless service provider within 30 days of the interviews, and nearly 40% stated having an interaction with law enforcement in the past 30 days, while roughly 50% interacted with an environmental organization. The data results also revealed a disconnect between homeless individuals and the shelter system. The homeless individuals interviewed in the study avoided the shelter because they could not bring their partner or pet, the lack of safety inside the shelter, and the chance of having their possessions stolen by other shelter residents (Flanigan & Welsh, 2020).

Another common theme presented in the study was health concerns and hygiene access. Roughly 19% of participants stated that they had Hepatitis A compared to zero participants who did not live along the river. Roughly 38% reported knowing someone who had Hepatitis A. About 26% reported having a serious illness like shigellosis or another severe illness. About 34% of homeless individuals living along the river reported having bloody or severe diarrhea compared to zero who did not live along the river (Flanigan & Welsh, 2020).

Hygiene practices from the study revealed that most individuals would rather interact with private businesses than interact with government or non-profit services. Regarding a few hygiene practices from the 28 individuals who did not reside along the river, 50% stated that they defecated in a port-a-potty or public restroom, and 71% stated that they used a bathroom at a business establishment. Moreover, 75% stated that they used soap when able to wash their hands. Fifty-six individuals, roughly 76% of the sample, reported open defecation. Fifty percent reported using a port-a-potty or public restroom, while 80% reported using soap when accessing a sink. Neither river residents nor non-river residents reported a high percentage of those using the river for drinking; overall, the results revealed nearly 15%. Lastly, Flanigan and Welsh's (2020) study revealed service barriers to riverbed residents, concerns with staff safety, and resource constraints.

Flanigan and Welsh (2020) learned that there were countervailing systems and subsystems to address homelessness in San Diego. Unsheltered homeless individuals preferred to avoid emergency shelters, which is a direct pathway to mental health and substance abuse services. Unsheltered homeless individuals reported a high rate of open defecation and a lack of access to bathrooms, clean water, sanitation, and hygiene resources, which resulted in communicable diseases. Flanigan and Welsh (2020) found that the result of the Hepatitis A outbreak led to the police meeting their citation threshold by issuing citations and the public health department ensured the environment was clean after the outbreak, but it led to a displacement of homeless individuals. After the outbreak and citations, the homeless moved along the riverbed with less access to hygiene services, increasing the risk of spreading contagious diseases along the watershed. Flanigan and Welsh (2020) argued that the broader

system should have better understood their position as a public agency to avoid worse conditions for the homeless.

Similar findings found in a master's research study by Dubas-Blankers (2020) found that homeless encampment sweeps in Seattle, Washington were ineffective in providing long-term solutions for homeless individuals. The City of Seattle manages encampment sweeps through six city departments and other organizations that remove waste and provide outreach services. Dubas-Blanker's (2020) research found that in 2019, Seattle spent roughly $8,000,000 dollars on encampment cleanups and removed nearly 934 encampments. Dubas-Blanker (2020) found that re-encampment often occurred with campers rotating between common locations that were hidden from the public's view or near resources. Encampment removals in Seattle happened when a safety concern, criminal activity, a complaint, hazardous waste, a threat to the environment occurred, or when an encampment was growing. Dubas-Blanker (2020) found that the shelter referral rate was relatively low and the homeless were often denied services because most homeless individuals did not want to follow the stringent rules. Most shelters disallow a partner or a pet and require maintaining a certain level of sobriety and loss of personal belongings.

Based on Dubas-Blanker's (2020) research, the city of Seattle should have reconsidered the effectiveness of sweeps based on the rate of re-encampment, trauma to homeless individuals, the success of providing temporary permanent housing, and the negative impact on the environment.

Dubas-Blankers (2020) provided three solutions to addressing homelessness. First, he stated that homeless encampments should be viewed more positively. Second, Dubas-Blanker's (2020) study stated that the resources should be brought directly to the homeless encampment,

breaking down barriers to accessing resources. Third, through the Asset-Based Community Development and Action Research approach, homeless individuals can be empowered to take responsibility for their encampment by keeping the area free of trash. The final solution in Dubas-Blanker's (2020) study stated that homeless individuals should be allowed to stay where they are with authorized tiny house villages.

A similar argument presented in a research study by Junejo et al. (2016) found that embracing homeless encampments may offer a more effective solution than frequent sweeps. Junejo et al. (2016) stated that many local governments focus too much on ending the visibility of homelessness rather than ending homelessness itself. Junejo et al. (2016) argued that sweeps send the message that people experiencing homelessness are unaccepted in society. By embracing that they do exist, encampments offer a proper transitional or permanent housing solution. Junejo et al.'s (2016) research stated many benefits to encampment living, such as safety and security, a sense of community, autonomy, stability, and visibility. Junejo et al. (2016) shared the benefits of organized encampments which would provide 24-hour security systems where residents could watch over the encampments and sign a contract that would prevent violence, alcohol, and drugs. In an organized encampment, the police department would offer surveillance services with frequent walkthroughs.

Moreover, encampment living could provide a sense of community, with residents gaining neighbors, friends, and a support system. When homeless individuals are constantly moved around in a transient housing situation, it is harder for them to become stable. Homeless encampments also provide autonomy as homeless shelters have many rules and can feel paternalistic. Junejo et al.'s (2016) research stated that shelters could be oppressive, depressive, and repressive, and encampment rules are geared toward safety and collaboration rather than

controlling resident behaviors. Lastly, Junejo et al.'s (2016) research found that encampment living could provide stability among women, men, and families, and the visibility of encampments may encourage lawmakers to find more permanent solutions to homelessness.

Rose (2019) examined park users' perspectives on homeless individuals residing in City Creek Canyon in Salt Lake City, Utah. The study asked park users if they were aware of homeless individuals, their use of park facilities, and how they felt about their presence in the park. The study collected responses from 332 park users and found that most respondents were aware of individuals facing homelessness and the use of park facilities. Homeless individuals in the park did not substantially influence participants' recreational use of the park, nor did it change park users' views on park safety. The study also found that park users did not view homeless individuals as an environmental risk. Participants responded to questions regarding the negative impact on the environment, water quality, and wildlife due to homeless inhabitants, and all three questions scored relatively low. Rose (2019) stated in the study that City Creek Canyon did provide seasonal restroom facilities for park users. Because sanitation is provided, a negative impact to water quality scored below average.

Rose's (2019) findings support homelessness solutions provided by Junejo et al. (2016) and Dubas-Blankers (2020) in that solving homelessness may require a shift in the way community residents view homeless individuals living in public parks and along waterways. To protect the environment, homeless individuals must obtain a sense of ownership to keep their living space clean, and local laws can provide rules for sanctioned encampments and resources. Moreover, allowing homeless individuals to remain where they are may provide temporary solutions to housing until permanent affordable housing is available.

METHODOLOGY

This research used a Program Evaluation to examine the problem, the solution, the implementation, and then evaluated trash removal data from the Direct Discharge Trash Control Program. Program evaluators seek to understand social patterns of behavior and use a theory-driven approach to understand what happens during the implementation of a program (Goodman and Berry-James, 2018, Pg.16). This research drew upon previous studies to identify common themes with encampment living along waterways and analyzed trash removal data to see whether the program met trash reduction targets while managing trash and homelessness. The data collected is publicly available trash removal data from section C.10 of the annual stormwater reports published by the City of San Jose's Environmental Services Department. This research sought to answer whether the Direct Discharge Trash Control Program met the NPDES trash load reduction targets with removal of trash from homeless encampments along creeks. The stormwater annual reports show the date, the location, and the amount of trash removed from each abatement site.

The Findings section of this paper includes the implementation phase, including reporting requirements, and summarizes the Direct Discharge Trash Control program offsets and how they are included in the overall trash load reduction targets. The evaluation section of this paper includes the trash load reduction percentages by year. This research focused on five years of program implementation between the years of 2015-2020. The report also includes the NPDES trash load reduction standard and outreach services to homeless individuals. This paper used the Geographic Information System (GIS) to show where most homeless encampments and encampment cleanups occurred. This research paper did not use any human subjects, so received an IRB exclusion.

FINDINGS

The NPDES permit has several requirements to mitigate pollution in waterways. To track trash load reductions, permittees follow the guidelines in section C.10 of the NPDES permit. Requirements are summarized in the table below.

Table 1: NPDES Provision C.10 Trash Load Reduction Summary

	NPDES Provision C.10 Trash Load Reduction Summary
	Permittees shall demonstrate compliance with Discharge Prohibition A.1., for trash discharges, Discharge Prohibition A.2., and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems in accordance with the requirements of the provision.
A.1	Permittees shall reduce trash discharges from 2009 trash levels: • 70 percent by July 1, 2017 • 80 percent by July 1, 2019, and • 100 percent by July 1, 2022
A.2	**Trash Generation Area Management** Permittees shall demonstrate attainment of the C.10.a.i trash discharges percentage-reduction requirements by management of mapped trash generation areas within their jurisdictions delineated on Trash Generation Area Maps included with their Long-Term Trash Reduction Plans. • Low = less than 5 gal/acre/yr • Moderate = 5-10 gal/acre/yr • High = 10-50 gal/acre/year; and • Very High = greater than 50 gal/acre/yr Trash generation = gallons, per acre, per year

Source: California Regional Water Quality Control Board San Francisco Bay Region, 2015)

Permittees are required to use the following calculation to measure trash reduction from very high trash accumulation areas to low trash accumulation areas within their jurisdiction.

Permittees are required to compare their trash reduction efforts to 2009 trash accumulation levels. The below table summarizes how to calculate trash reductions.

Table 2: Trash Reduction Calculation

Trash Reduction Calculation	% Reduction = 100 {(12Avh(2009) + 4Am(2009) + Am(2009) – (12Avh+4Ah + Am)}/(12Avh2009+4Ah2009+AM2009)
Definition of Calculations	• AVH(2009) = total amount of the 2009 very high trash generation category jurisdictional area AH(2009) = total amount of the 2009 high trash generation category jurisdictional area • AM(2009) = total amount of the 2009 moderate trash generation category jurisdictional area AVH = total amount of very high trash generation category jurisdictional area in the reporting year • AH = total amount of high trash generation category jurisdictional area in the reporting year • AM = total amount of moderate trash generation category jurisdictional area in the reporting year • 12 = Very High to Moderate weighing ratio • 4 = High to Moderate weighing ratio • 100 = fraction to percentage conversion factor
Offset Calculation	% Reduction Offset (Volume) = (12Avh(2009) + 4Ah(2009) +Am(2009)

Offset Calculation Definition	• AVH = total amount of very high trash generation category jurisdictional area in the reporting year • AH = total amount of high trash generation category jurisdictional area in the reporting year • AM = total amount of moderate trash generation category jurisdictional area in the reporting year • 12 = Very High to Moderate weighing ratio • 4 = High to Moderate weighing ratio • Of = offset factor equal to (7.5 x 0.033) for the 2016 performance guideline and 2017 mandatory trash load reduction deadline

Source: California Regional Water Quality Control Board San Francisco Bay Region, 2015, 97 106

If a permittee submits a robust trash reduction plan related to additional source controls other than a storm drain, an "offset" calculation can be applied to the overall trash reduction targets. The City of San Jose claims a 15% trash load reduction from the Direct Discharge Trash Control program and applies the "offset" to their trash load reduction targets each year. Below are the reporting requirements for trash management areas managed by full trash capture systems, additional source controls, and trash offsets.

Table 3: NPDES C.10. Trash Load Reduction Reporting Requirements

NPDES Summary: For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High, or Moderate trash generation) Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage	**Section**
Trash Load Reductions	
Percent of trash reduction in all Trash Management Areas (TMAS) due to Trash Full Capture Systems: Permittees shall maintain, and provide for inspection and review upon request, documentation of the design, operation, and maintenance of each of their full trash capture systems, including the mapped location and drainage area served by each system	**C.10.b**
Percent Trash Reduction in all TMA's due to Control Measures other than Trash Full Capture Systems: Permittees shall maintain, and provide for inspection and review upon request, documentation of non-full trash capture system trash control actions that verifies implementation of each action. Permittees shall also conduct assessment of the action that verifies effectiveness of the action or combination of actions and maintain, and provide for inspection and review upon request, documentation of assessments.	**C.10.ii**
Percent Trash Reduction due to Jurisdictional-Wide Source Control Actions: Permittee jurisdiction-wide actions to reduce trash at the source, particularly persistent trash items, may be valued toward trash load reduction compliance by ten percent load reduction total for all such actions. To claim a load reduction percentage reduction value, Permittees must provide substantive and credible evidence that these actions reduce trash by the claimed value.	**C.10.iv**
Trash Offsets	**C.10.e**
Offsets associated with additional Creek and Shoreline Cleanups: A permittee may offset part of its provision C.10.a a trash load percent reduction requirement by conducting additional cleanup of creek and shoreline areas beyond trash hot spot	**C.10.ei**

cleanups required by C.10.c. if the additional cleanup efforts are conducted at frequency of at least twice per year and sufficient to demonstrate sustained improvement of the creek or shoreline area. The maximum offset that may be claimed is ten percent.	
Offsets Associated with Direct Trash Discharges: A permittee may offset an additional part of its provision C.10.a trash load percent reduction requirement by implementing a comprehensive plan approved by the Executive Officer for control of direct discharges of trash to receiving waters from non-storm drain system sources. The maximum offset that may be claimed is 15% using the C.10.e.i formula. The plan shall be submitted no later than February 1 of the first year in which the offset will be reported in the following Annual Report and shall include the following A. Description of sources of the directly discharged trash; B. Description of control actions that will be implemented during the permit term to prevent or reduce direct discharge trash loads in as systematic and comprehensive manner; C. A map of the affected receiving water area and associated watershed; and D. Description of how effectiveness of controls will be assessed, including documentation of controls, quantification of trash volume controlled, and assessment of resulting improvements to receiving water conditions.	**C.10.eii**

Source: California Regional Water Quality Control Board San Francisco Bay Region, 2015, 97 106

The following tables include the City of San Jose's trash load reduction percentages by year based on their full trash capture systems, additional trash programs, and trash source controls. The first percentage in the table reflects the overall trash load reduction per trash management area (TMA) by the city's full trash capture systems. The second percentage represents the trash load reduction from additional city trash programs, such as the Adopt-a-Park program, Anti-Litter Program, and the Public Litter Cans program. The third percentage represents the city's source control actions from the single-use carryout bag ordinance ban and the foam food

container ordinance ban. The Direct Discharge Trash Control program is a part of the city's "offset calculation" that is included in the overall trash load reduction percentage each year. The city also claims a 10% reduction offset from non-profit creek cleanups.

Table 2: 2015-2016 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage, including whether the 60% trash reduction performance guideline was attained. If not attained, include a discussion of next steps (e.g., development of a detailed plan or report of non-compliance).

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	16.5%
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[93]	1.8%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)[1]	10.0%
Sub-Total for Above Actions	**28.3%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	10.0%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	15.0%
Total (Jurisdictional-wide) % Trash Load Reduction in FY 15-16	**53.3%**

Discussion of Trash Load Reduction Calculation:

The City attained and reported a 77% trash load reduction in its FY 14-15 Annual Report, exceeding the trash load reduction target of 40% by 2014. The new Permit contains a revised calculation methodology that eliminates or caps past trash load reduction offsets or credits. Based on the new calculation methodology, as of July 1, 2016, San José has attained a 53% trash load reduction (including trash offsets). The new Permit also added a performance guideline of attaining 60% trash reduction by July 1, 2016. The City did not have sufficient time to adjust existing trash control implementation plans to achieve the new non-mandatory target, but expects to exceed the mandatory 70% trash load reduction requirement by June 30, 2017. The City has prepared a Trash Action Plan[94] to document the description and schedule of additional trash load reduction control actions that will be implemented to attain and exceed the required 70% percent reduction by July 1, 2017.

Source: City of San Jose Stormwater Management Annual Report, 2014-2016, Pg. 10-1

Table 3: 2016-2017 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage, including whether the 70% mandatory trash load reduction deadline was attained. If not attained, attach and include reference to a Plan to comply with the deadline in a timely manner, which should include the Permittee's plan and schedule to install full capture systems/devices.

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	36%
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[64]	8.2%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)[1]	10.0%
Subtotal for Above Actions	**54.2%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	10.0%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	15.0%
Total (Jurisdictional-wide) % Trash Load Reduction in FY 16-17	**79.2%**

Discussion of Trash Load Reduction Calculation and Attainment of the 70% Mandatory Deadline: The City attained and reported 53% trash load reduction (including trash offsets) in its FY 15-16 Annual Report). Because the City did not achieve the non-mandatory performance guideline of 60% by July 1, 2016, a Trash Action Plan was prepared and submitted to the Water Board to document the description and schedule of additional trash load reduction control actions that would be implemented to attain and exceed the required 70% reduction by July 1, 2017. During FY 16-17, the City implemented robust trash control measures, such as installing 11 large trash capture systems, to exceed the mandatory 70% trash load reduction requirement. The total (jurisdiction-wide) percent trash load reduction in FY 16-17 is 79.2%.

Source: City of San Jose Stormwater Management Annual Report, 2016-2017, Pg.10-1

Table 4: 2017-2018 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	38.9%
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[69]	14.4%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)	10%
Subtotal for Above Actions	**63.3%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	10%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	15%
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2017-18	**88.3%**

Discussion of Trash Load Reduction Calculation: As of July 1, 2018, the City attained 88.3% trash load reduction, an increase of 9.1% from the previous year. The increase is due to the implementation of a robust set of trash control measures such as the installation of large trash capture systems, a comprehensive Direct Discharge Program, additional creek and shoreline cleanups, City-wide source control actions, and other measures. The most recent version of the City's Baseline Trash Generation Map can be downloaded at http://www.sanjoseca.gov/Archive.aspx?AMID=160&Type=&ADID=

Source: City of San Jose Stormwater Management Annual Report, 2017-2018, Pg.10-1

Table 5: 2018-2019 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	46.2%
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[67]	15.6%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)	10%
Subtotal for Above Actions	**71.8%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	10%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	15%
Total (Jurisdictional-wide) % Trash Load Reduction through FY 18-19	**96.8%**

Discussion of Trash Load Reduction Calculation and Attainment of the 80% Mandatory Deadline:

As of July 1, 2019, the City has attained a 96.8% trash load reduction based on the load reduction calculation methodology included in the MRP. This is an increase of 8.5% from the previous fiscal year. The increase is due to implementation of a robust set of trash control measures such as the installation of additional large trash capture systems, continued implementation of the City's comprehensive Direct Discharge Program, conducting additional creek and shoreline cleanups, City-wide source control actions, and other measures. The most recent versions of the City's Baseline Trash Generation Map and Trash Full Capture System map can be downloaded at http://www.sanjoseca.gov/Archive.aspx?AMID=160&Type=&ADID=

Source: City of San Jose Stormwater Management Annual Report, 2018-2019, Pg.10-1

Table 6: 2019-2020 Trash Load Reduction

C.10.a.i ► Trash Load Reduction Summary

For population-based Permittees, provide the overall trash reduction percentage achieved to-date within the jurisdictional area of your municipality that generates problematic trash levels (i.e., Very High, High or Moderate trash generation). Base the reduction percentage on the information presented in C.10.b i-iv and C.10.e.i-ii. Provide a discussion of the calculation used to produce the reduction percentage

Trash Load Reductions	
Percent Trash Reduction in All Trash Management Areas (TMAs) due to **Trash Full Capture Systems** (as reported C.10.b.i)	49.6%
Percent Trash Reduction in all TMAs due to **Control Measures Other than Trash Full Capture Systems** (as reported in C.10.b.ii)[64]	14.8%
Percent Trash Reduction due to **Jurisdictional-wide Source Control Actions** (as reported in C.10.b.iv)	10%
SubTotal for Above Actions	**74.4%**
Trash Offsets (Optional)	
Offset Associated with Additional Creek and Shoreline Cleanups (as reported in C.10.e.i)	10%
Offset Associated with Direct Trash Discharges (as reported in C.10.e.ii)	15%
Total (Jurisdictional-wide) % Trash Load Reduction through FY 2019-20	**99.4%**

Discussion of Trash Load Reduction Calculation:

As of July 1, 2020, the City has attained a 99.4% trash load reduction based on the load reduction calculation methodology included in the MRP. This is an increase of 2.6% from the previous fiscal year. The increase is due to 1) refinements made to the City's Baseline Trash Generation Map based on more complete and accurate information on trash generation gained through baseline trash assessments, and 2) continued implementation of a robust set of structural trash control measures (e.g., large trash capture systems), implementation of the City's comprehensive Direct Discharge Program, conducting additional creek and shoreline cleanups, citywide source control actions, and other measures. The most recent versions of the City's Baseline Trash Generation Map and Trash Full Capture System map can be downloaded at https://scvurppp.org/trash-maps/.

Control Measure Modifications during COVID-19 Pandemic:

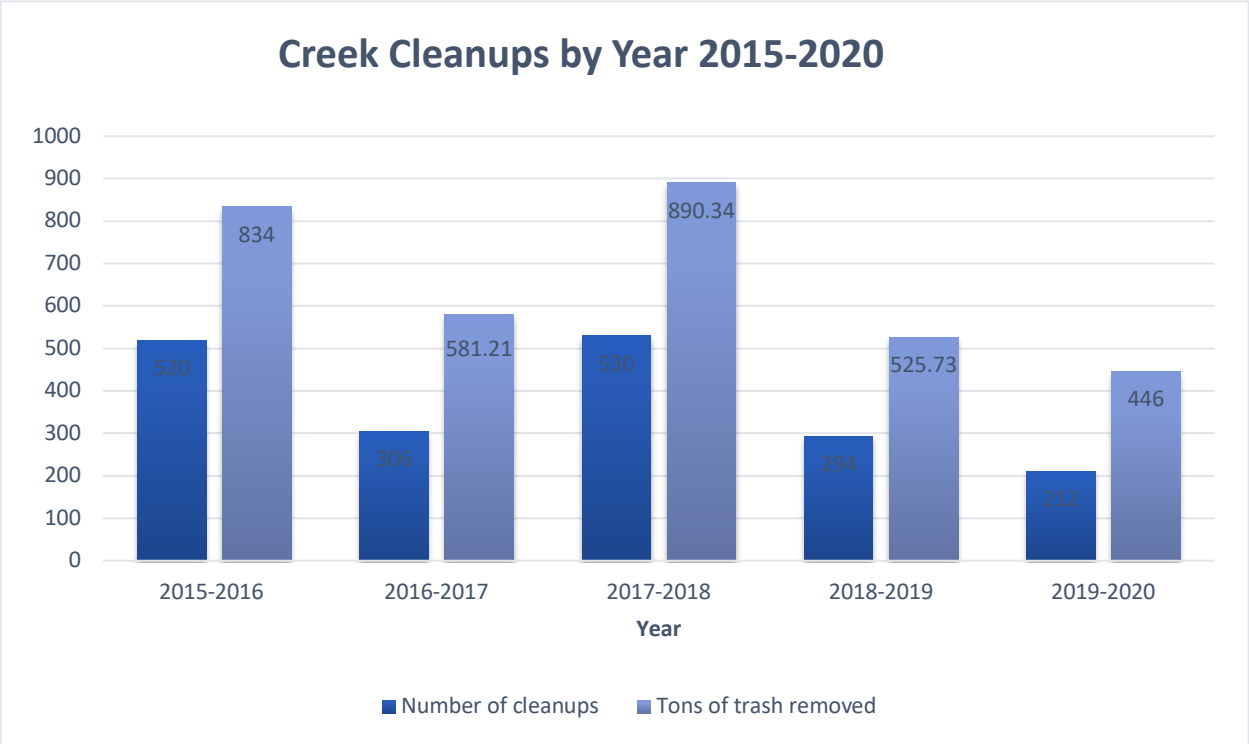
Due to the COVID-19 pandemic and County of Santa Clara's public health orders, the City had to modify trash control measure implementation for a period of time during the spring of 2020. Modifications included the suspension of illegal dumping pick up (RAPID), Park Ranger patrols, Homeless Response Team encampment abatements (on-land and waterway) and volunteer on-land cleanups (including the Great American

Source: City of San Jose Stormwater Management Annual Report, 2019-2020, Pg.10-1

Direct Discharge Trash Control Program Cleanups

Below is the number of creek cleanups/encampment abatement and the tonnage of trash removed from creeks in San Jose from 2015-2020 by the Homeless Response Team, Watershed Protection, and Park Rangers

Graph 1: Creek Cleanups by Year



Source:

City of San Jose Stormwater Management Annual Report, 2016, Pg. A-87

City of San Jose Stormwater Management Annual Report, 2017, Pg. A-139

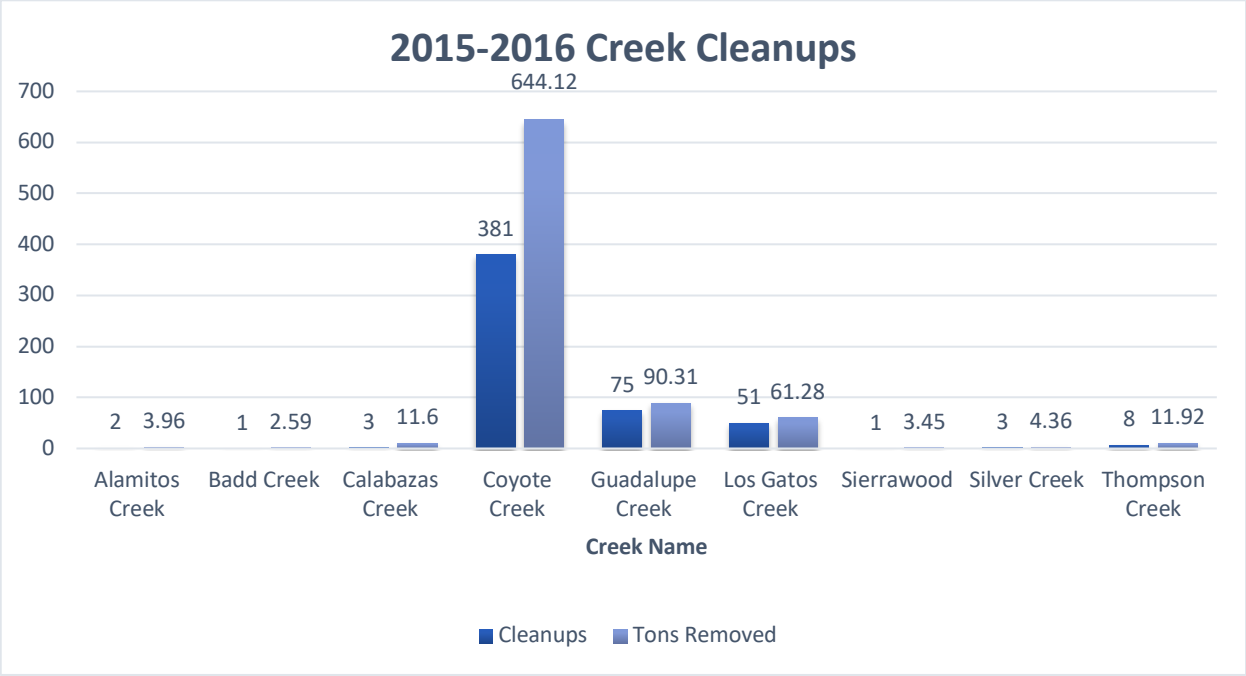
City of San Jose Stormwater Management Annual Report, 2018, Pg. A-85

City of San Jose Stormwater Management Annual Report, 2019, Pg. A-88

City of San Jose Stormwater Management Anuual Report, 2020, Pg. A-81

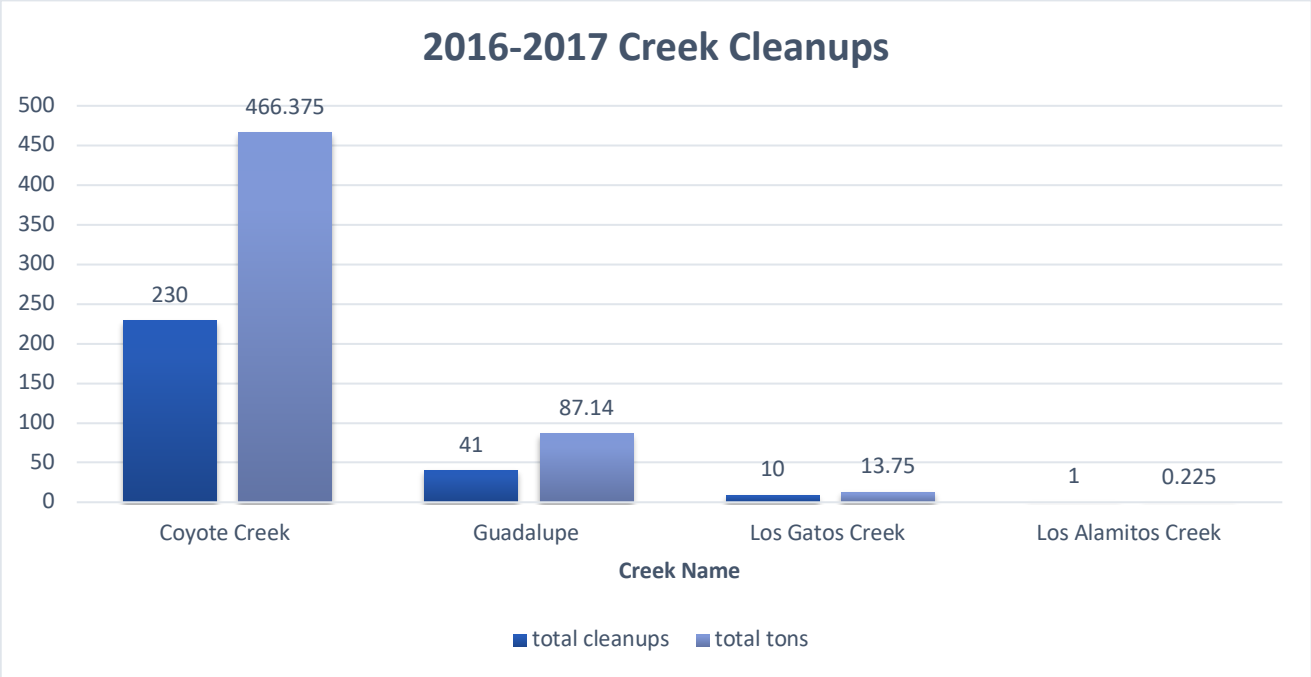
Below is the number of creek cleanups and tons removed by each creek from 2015-2016 by the Homelessness Response Team and Watershed Protection.

Graph 2: Creek Cleanups by Creek 2015-2016



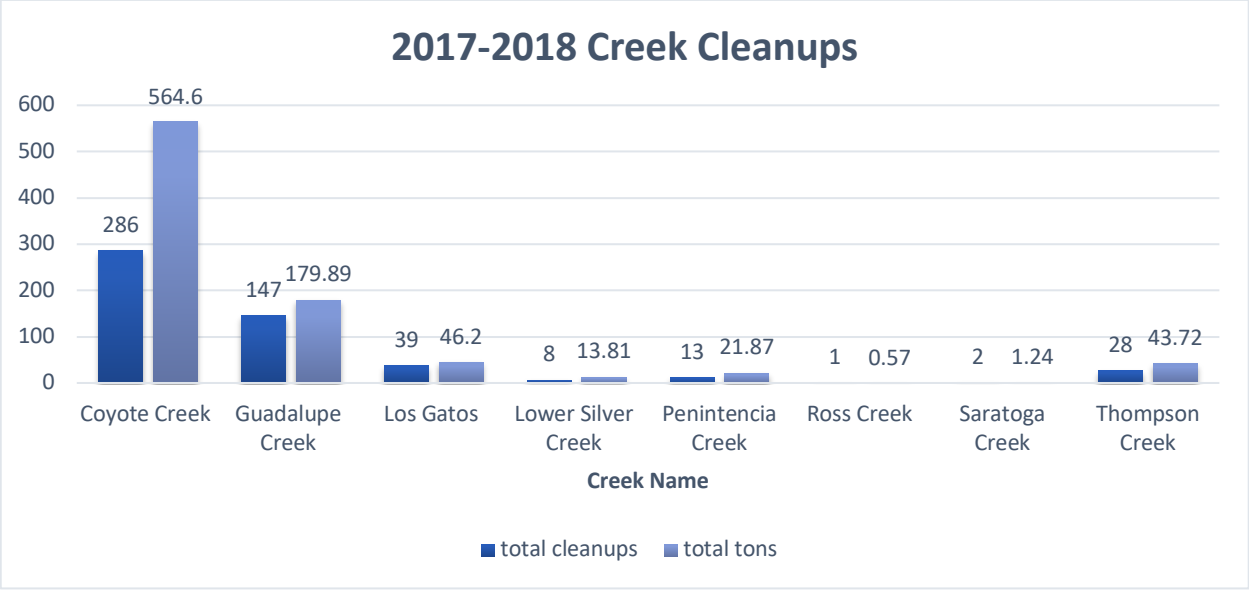
Source: City of San Jose Stormwater Management Annual Report, 2016, Pg. A-88—A-100

Graph 3: Creek Cleanups by Creek 2016-2017



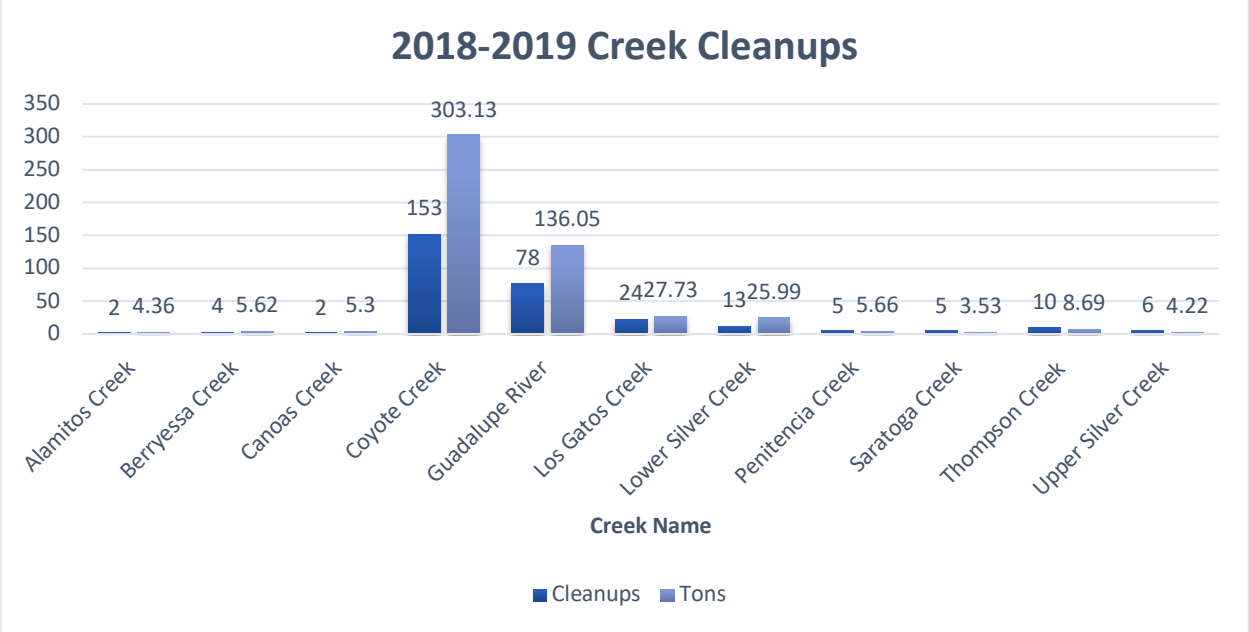
Source: City of San Jose Stormwater Management Annual Report, 2017, Pg. A-119—A-129

Graph 4: Creek Cleanups by Creek 2017-2018



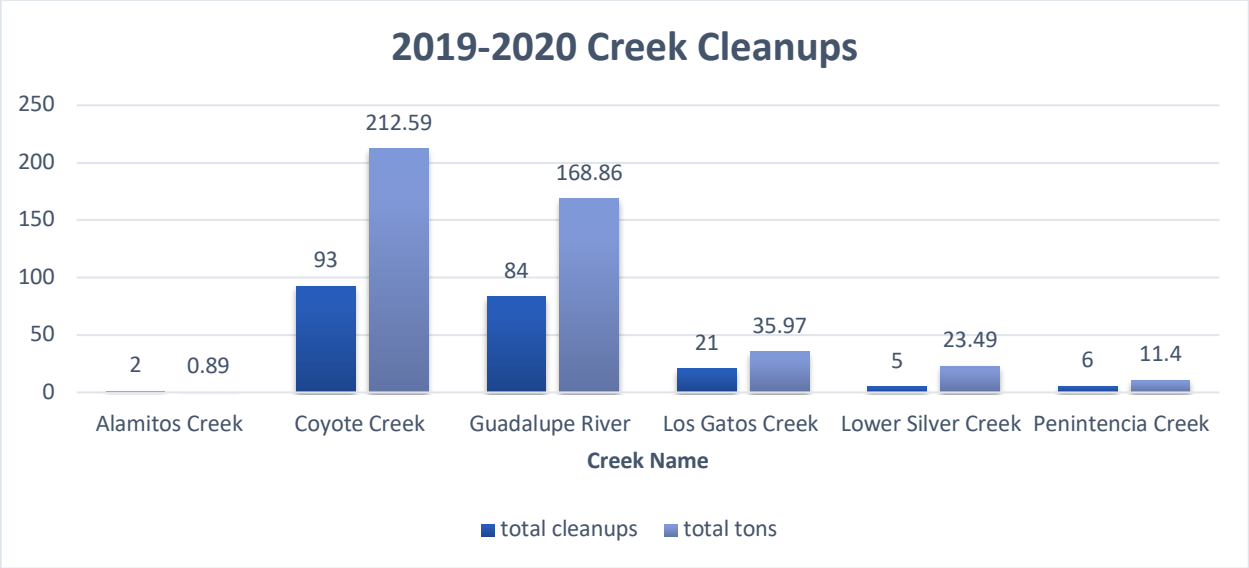
Source: City of San Jose Stormwater Management Annual Report, 2018, Pg. A-61—A-72

Graph 5: Creek Cleanups by Creek 2018-2019



Source: City of San Jose Stormwater Management Annual Report, 2019, Pg. A-66—A-73

Graph 6: Creek Cleanups by Creek 2019-2020

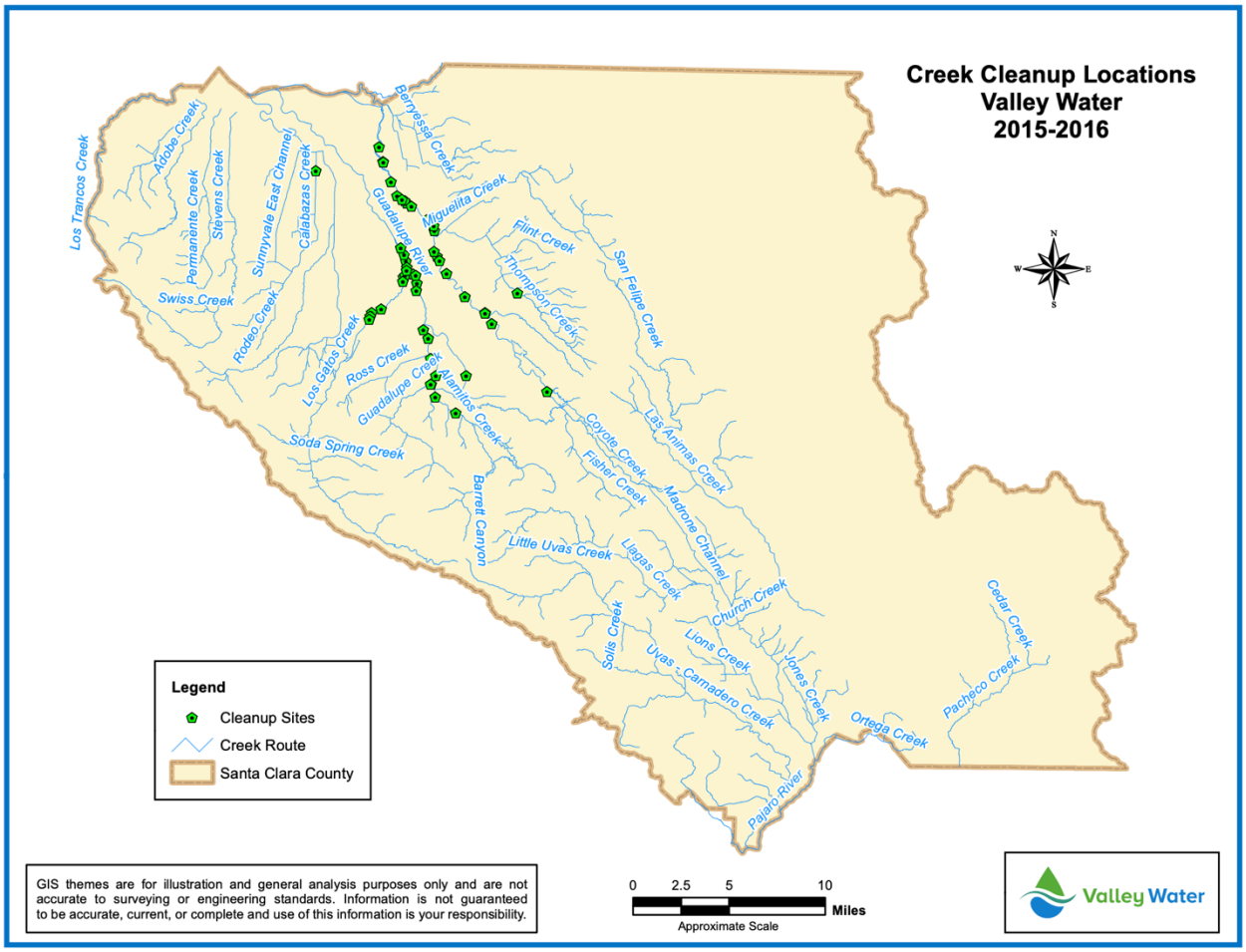


Source: City of San Jose Stormwater Management Anuual Report, 2020, Pg. A-60—A-65

San Jose Direct Discharge Creek Cleanup Locations

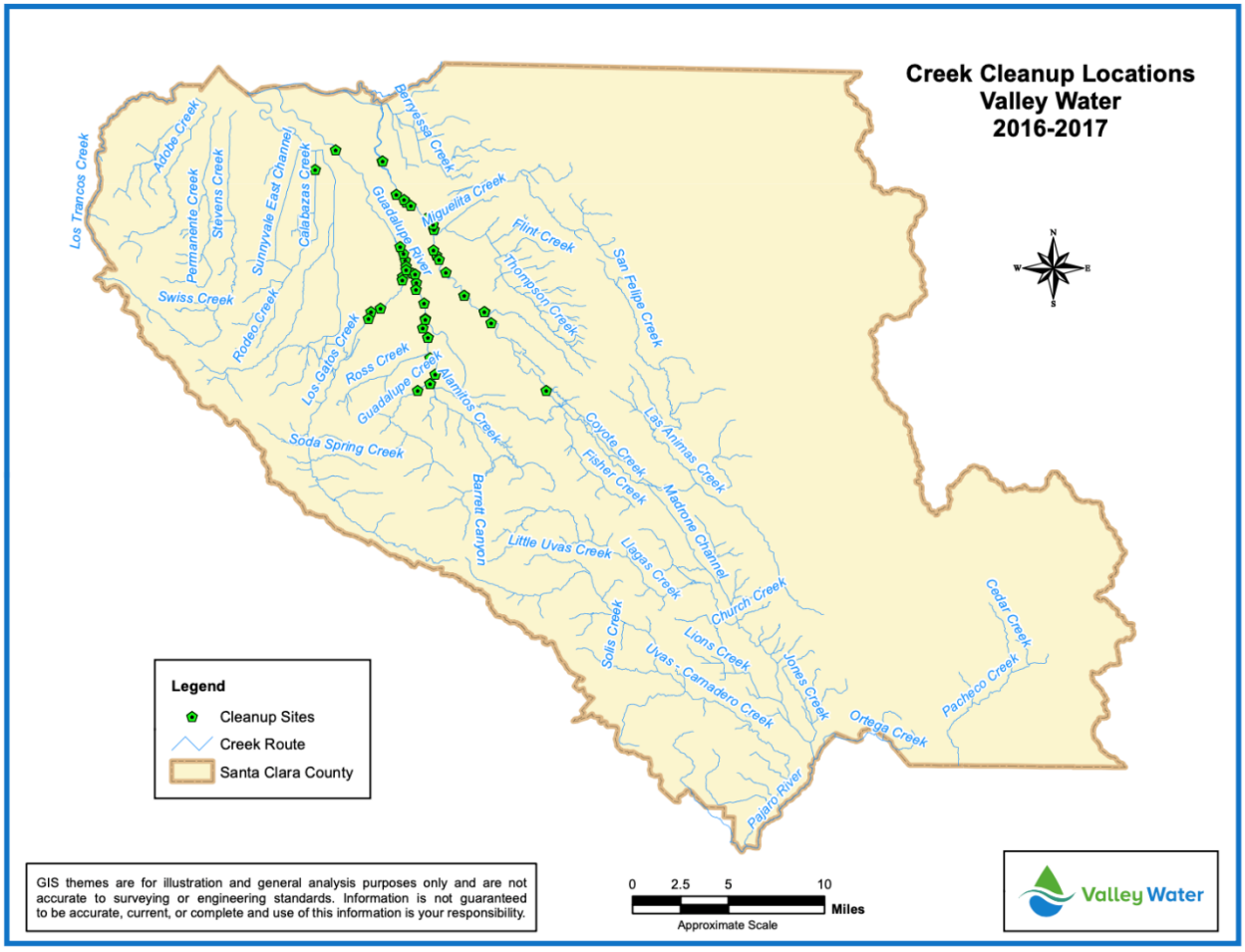
The following maps indicate where most cleanups occurred along waterways in San Jose. The creek cleanup locations were created using previous geocoded locations provided by Valley Water who partners with the city of San Jose on creek cleanups. The geocoded locations were matched with the creek cleanup locations provided in the annual stormwater reports. Not all creek cleanup locations are reflected, but a full list of creek cleanup locations can be found in each annual report.

Map 1: Creek Cleanup Locations 2015-2016



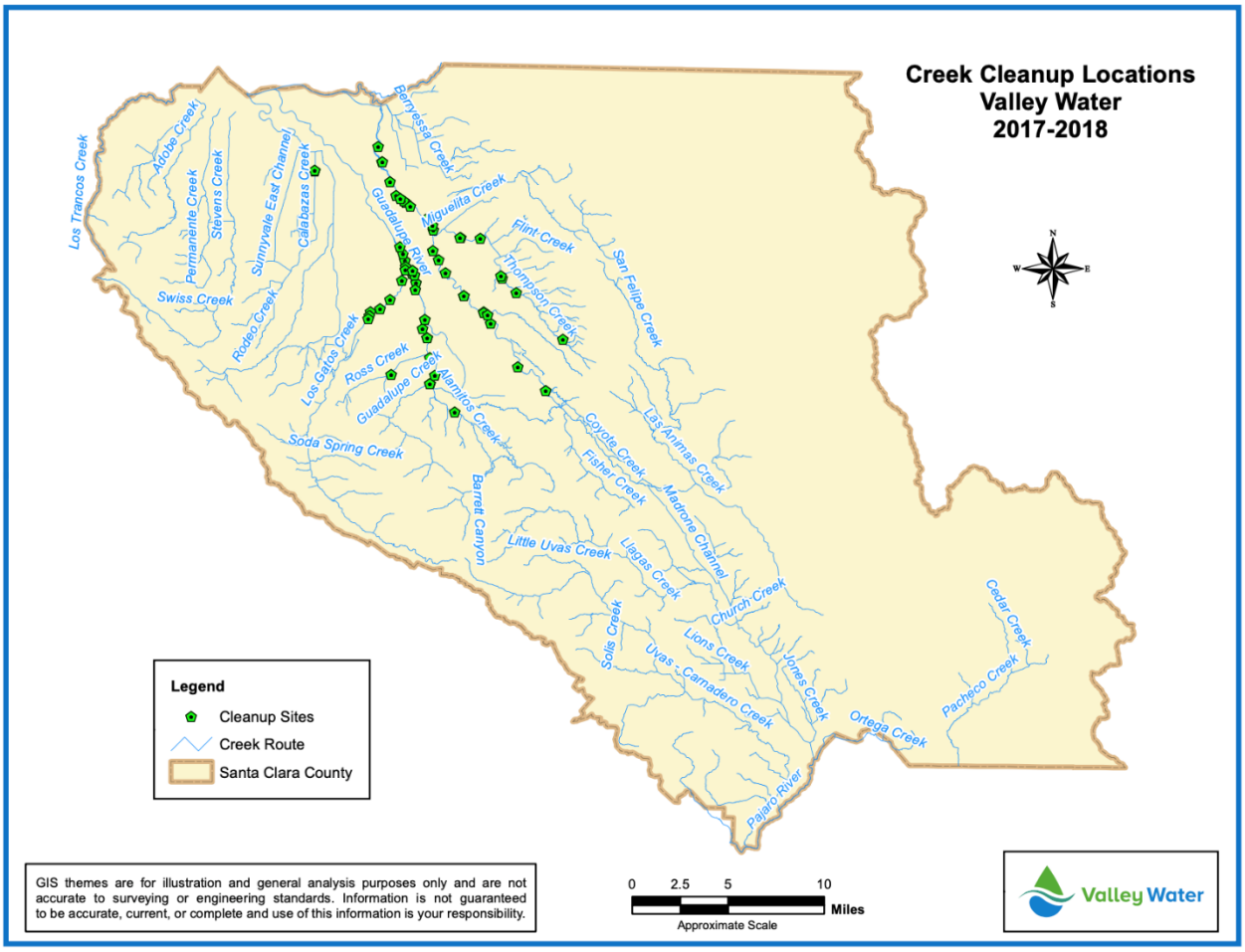
Source: City of San Jose Stormwater Management Annual Report, 2016, Pg. A-88—A-100

Map 2: Creek Cleanup Locations 2016-2017



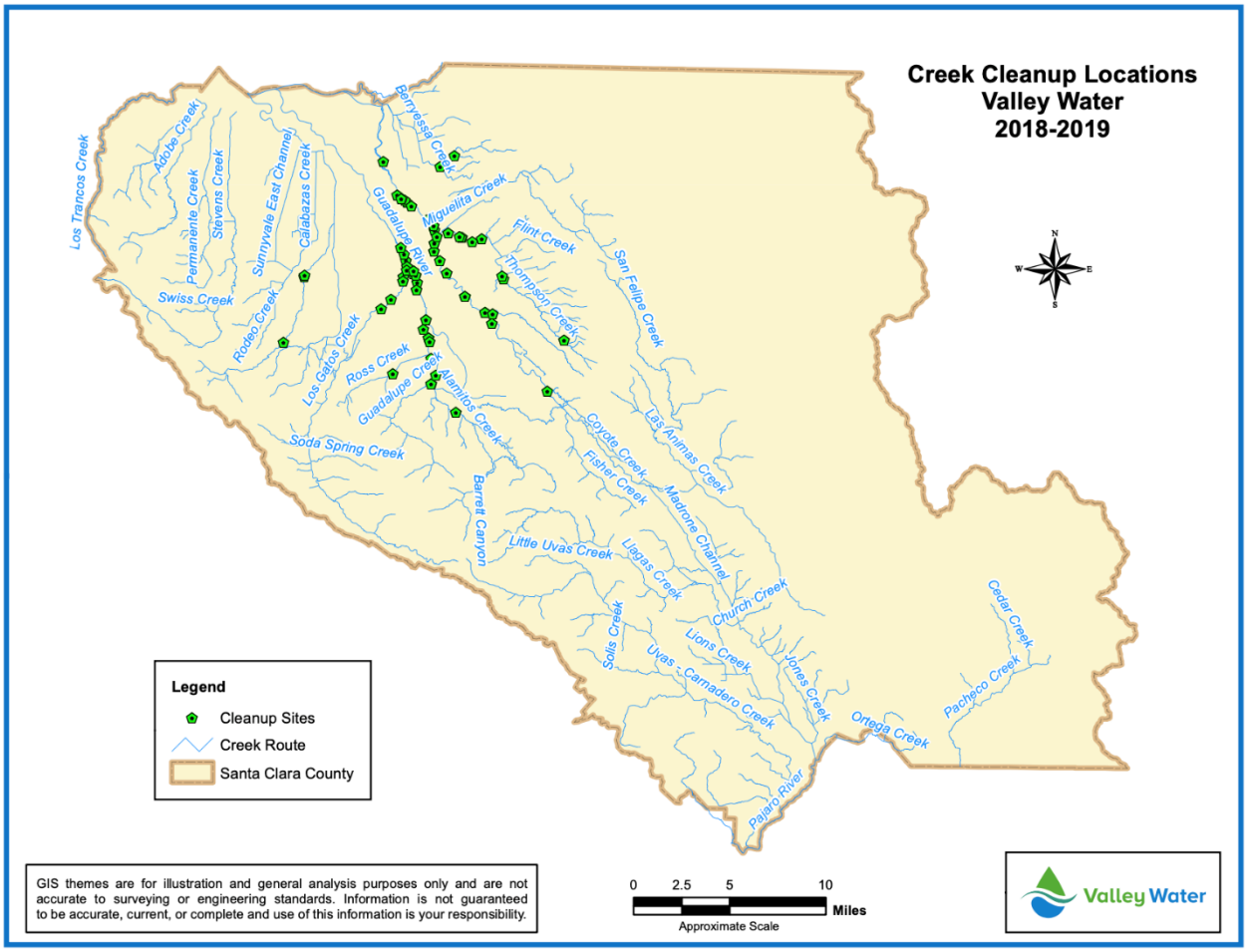
Source: City of San Jose Stormwater Management Annual Report, 2017, Pg. A-119—A-129

Map 3: Creek Cleanup Locations 2017-2018



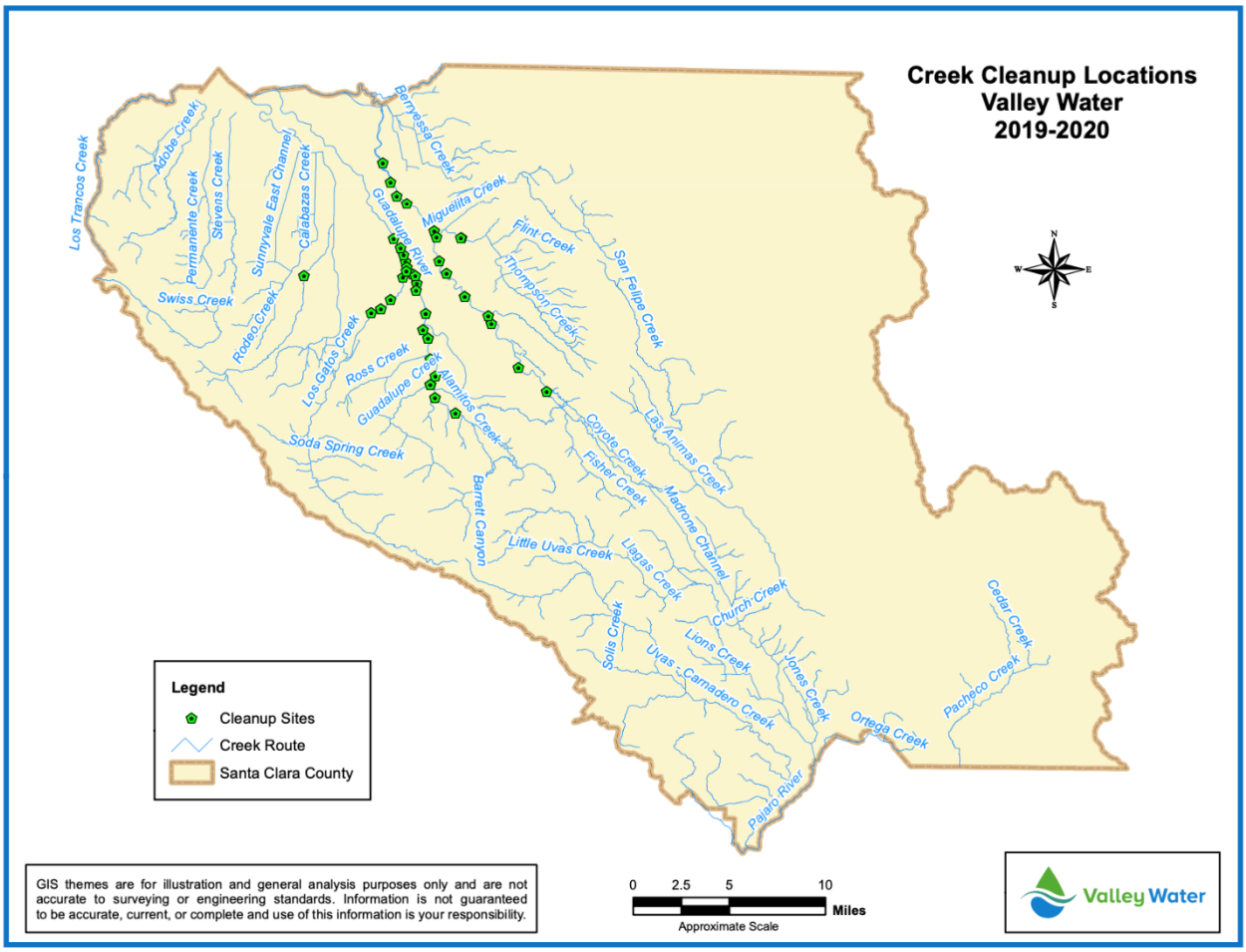
Source: City of San Jose Stormwater Management Annual Report, 2018, Pg. A-61—A-72

Map 4: Creek Cleanup locations 2018-2019



Source: City of San Jose Stormwater Management Annual Report, 2019, Pg. A-66—A-73

Map 5: Creek Cleanup locations 2019-2020



Source: City of San Jose Stormwater Management Anuual Report, 2020, Pg. A-60—A-65

Direct Discharge Trash Control Program Outreach

Table 7 is an average of encampments along waterways each year.

Table 7: Annual Average Number of Encampments

Year	*Annual Average Encampment Counts*
2016-2017	22
2017-2018	114
2018-2019	229
2019-2020	260

Source:

City of San Jose Stormwater Management Annual Report, 2017, Pg. A-141
City of San Jose Stormwater Management Annual Report, 2018, Pg. A-84
City of San Jose Stormwater Management Annual Report, 2019, Pg. A-87
City of San Jose Stormwater Management Anuual Report, 2020, Pg. A-80

Table 8 is a summary of the housing outreach provided by PATH and HomeFirst before a creek cleanup/abatement occurred. If a homeless individual accepts services, the outreach worker performs a Vulnerability Index-Service Prioritization Decision Assistance Tool (VI-SPDAT). Once completed, the outreach worker can refer a homeless person or family to services. Depending on the need of the individual or family, they can be reffered to a short-term rapid rehousing program in an affordable housing unit, interim housing, an emergency shelter, or permanent supportive housing.

Table 8: Encampment Housing Outreach

Year	*Number of Interactions*	*Number of Housing Referrals*	*Housed*
2016-2017		462	25
2017-2018	1,165	63	
2018-2019	1,886	95	
2019-2020	3,349	133	

Source:

City of San Jose Stormwater Management Annual Report, 2017, Pg. A-141

City of San Jose Stormwater Management Annual Report, 2018, Pg. A-87

City of San Jose Stormwater Management Annual Report, 2019, Pg. A-84

City of San Jose Stormwater Management Anuual Report, 2020, Pg. A-85

ANALYSIS

San Jose is the tenth largest city in the U.S. and home to nearly one million residents. San Jose is roughly 180 square miles, with 140 miles of creeks and rivers running through its jurisdiction (Fakuda, 2016). Since the early 1990s, the City of San Jose has put forth an effort to remove trash along creeks due to homeless encampments (Fakuda, 2016). Since the inception of the Direct Discharge Trash Control Program, the city increased trash removal efforts and improved outreach services to homeless individuals living along creeks and rivers. The creek cleanups and encampment abatements involve multiple partners, including the city's Homeless Response Team, Environmental Services Department, and the Downtown Streets Team. Re-encampment prevention is coordinated by San Jose Park Rangers, the San Jose Police Department, and the California Department of Fish and Wildlife (CDFW).

In 2015-2016, the City of San Jose transitioned to the Direct Discharge Trash Control Program and conducted 520 creek cleanups and removed 834 tons of trash. Full implementation of the Direct Discharge Trash Program began in Spring of 2016; therefore, the annual report did not include data on outreach services to the homeless. the annual report did include additional cleanups from the Clean Creeks, Healthy City initiative and the Downtown Streets Team, which in total, removed 105.43 tons of trash and conducted 236 cleanups. In total, the program conducted 756 cleanups and removed 939.43 tons of trash. The following year, 2016-2017, the program conducted 306 cleanups and removed 581 tons of trash. In the same year, the program referred 462 individuals to services and housed 25 people. During program year 2017-2018, there were 530 cleanups and 890 tons of trash removed, with 1,655 interactions with homeless individuals and 63 referrals. In 2018-2019, the city reported 294 cleanups with 526 tons of trash removed. Outreach services interacted 1,886 times with homeless individuals and referred 95

people to housing services. In 2019-2020, the Direct Discharge Trash Control Program removed 446 tons of trash and conducted 212 cleanups through the beginning of March. In March of 2020, creek cleanups were suspended due to the COVID-19 pandemic, therefore, the reporting in 2019-2020 did not reflect an entire fiscal year.

Every year since the implementation of the Direct Discharge Trash Control Program, the City of San Jose included a 15% offset in their trash load reduction calculation and a 10% offset with additional creek cleanups conducted by Keep Coyote Creek Beautiful and the South Bay Creeks Coalition. With the additional creek cleanup efforts, the City of San Jose met the NPDES Trash load reduction targets of:

- 70 percent by July 1, 2017
- 80 percent by July 1, 2019, and
- 100 percent by July 1, 2022

Year	Trash Reduction
2015 – 2016	53.3%
2016 – 2017	79.2%
2017 – 2018	88.3%
2018 – 2019	96.8%
2019 – 2020	99.4%

Each year, the City of San Jose claimed a 25% offset reduction because of the additional non-profit creek cleanups and the Direct Discharge Trash Control program. With the additional program implementation, the city met their targets each year. Without the 25% offset reduction,

the city would have fallen short by 15.8% in the year 2016-2017 and 8.2% in the year 2018-2019. The city reported a 54.2% trash load reduction with installation of full trash capture systems in storm drains. The 54.2% includes city programs like Adopt-A-Park, Anti-Littering, Illegal Dumping, Free Junk Pickup, the BeautifySJ initiative and countless others. The city also accounts for the Single-Use Carryout Bag Ordinance ban and the Foam Food Container Ordinance ban in their trash reduction percentages. Without the 25% offset reduction in the year of 2018-2019, the city would have claimed a 71% reduction. Homeless encampment living along San Jose's creeks and rivers causes an abundance of trash in and around creeks, and without a robust program to address direct trash discharge, the City of San Jose would have had a difficult time meeting the trash reduction targets in some years.

During this research, it was clear that most cleanups occurred along Coyote Creek and Guadalupe River in downtown San Jose. Downtown San Jose has a wide range of homelessness services that are near Coyote Creek and Guadalupe River. In high trash areas, the city is required to clean the same trash hotspots every year under the NPDES permit, and most of the locations are in the core of downtown.

The city changed their homelessness outreach reporting methods from the number of housed individuals in the 2015-2016 year, to thereafter, the number of interactions with the homeless. The change in reporting could be the result of a low number of homeless individuals willing to accept services and the difficulties the city faces with building on-going relationships with the homeless. When an abatement occurs, and homeless individuals do not accept services, outreach workers cannot perform a VI-SPDAT, which is a vulnerability index service prioritization decision assistance tool that helps to determine risk and prioritization for emergency services. Outreach workers have to interact with a homeless individual multiple times before they are

willing to accept services. Based on the results from the VI-SPDAT from 2017-2020, outreach workers only have a 4.5% success rate in performing a VI-SPDAT on homeless individuals along waterways. The program did see an increase in interactions with the homeless from 2017 to 2020 and nearly tripled their interactions from 1,165 interactions to 3,349 and doubled their referrals.

The program faces some of the same challenges presented in Dubas-Blanker's (2020) study, which found that frequent encampment sweeps in Seattle temporarily addressed trash, but they were ineffective in keeping people from living on the streets. The study emphasized the difficulties in establishing a relationship with the homeless when an abatement displaced the individual or family. The City of San Jose is facing some of the same challenges with frequent abatements and not enough people accepting services.

However, the City of San Jose is embracing additional housing methods, such as interim housing (tiny homes), repurposing hotels for shelters, and safe parking locations. Since conducting this research, the City of San Jose published two additional Stormwater Annual Reports that include changes in the Direct Discharge Trash Control Program based on the emergency response from the COVID-19 pandemic. In the latest Stormwater Management Annual Report, the Direct Discharge Trash Control program included more information on city-wide trash removal and homelessness outreach efforts. In 2021, the City of San Jose expanded its BeautifySJ initiative to streamline its trash removal efforts, and reported a change in their coordination with the Housing Department.

Due to their increased efforts and multi-departmental coordination, the city focused more on project hot spot areas, increased interactions with the homeless, and established relationships with homeless individuals. The regular phased approach model was - and still is - suspended,

and regular abatements did not occur. As a result, there was a 125% increase in homeless encampments, and the city focused their efforts on providing sanitation services to help stop the spread of the virus. The BeautifySJ initiative established the Homeless Encampment Trash Program under the City's Emergency Operations Center. BeautifySJ provided trash removal services to over 225 encampment sites that included trash along waterways (Stormwater Annual Report, 2021-2022). In partnership with Santa Clara County, the Centers for Disease Control and Prevention (CDC) and many partnering agencies, the City of San Jose provided hygiene equipment such as portable toilets and handwashing stations in an effort to slow the spread of the virus (City of San Jose Stormwater Management Annual Report, 2021-2022). The City of San Jose also arranged garbage collection at large encampment sites (City of San Jose Stormwater Annual Report, 2021-2022). This research did not focus on the latest annual reports, as the program is still responding to the emergency response from COVID-19.

Housing As A Solution to Aquatic Pollution

The City of San Jose is one of the few cities in California to have a robust trash removal program specifically to address the unwanted impact of homeless encampments along waterways. The removal of trash from San Jose creeks helps to mitigate pollution that would otherwise flow into the San Francisco Bay. The City of San Jose, along with numerous governmental agencies and non-profit organizations, removes tons of trash per year from homeless encampments, and provides services to the homeless.

As it becomes increasingly difficult to build affordable housing, and with limited access to mental health services, the City of San Jose will continue to implement the Direct Discharge Trash Control Program and partner with other organizations to conduct creek cleanups,

encampment abatements, and provide social services to the homeless population at those locations.

As a solution to prevent re-encampment, the City of San Jose opened their interim housing (tiny home) community in 2020, also known as bridge housing. HomeFirst is the service provider that manages the bridge housing communities for eligible individuals looking for self-sufficieny (HomeFirst, n.d.).

To date, San Jose has five interim housing communities (City of San Jose Housing Department, 2021). Three out of the five are emergency interim housing communities and each site has 40 cabins for individuals (HomeFirst, n.d.). HomeFirst also operates the Boccardo Reception Center that serves 250 adults nightly (HomeFirst, n.d.). HomeFirst also provides veteran services, cold weather shelter programs, and family living centers. The city also works with PATH to provide interim housing at their Evans Lane Bridge Shelter that can house up to 48 people. PATH also has permanent housing units, called the Villas on the Park, that supports 84 permanent supportive homes (PATH, 2021).

Inspite of the Direct Discharge Trash Control program's changes due to the pandemic, the City of San Jose partnered with Santa Clara County and created a homeless hotline to provide one access point for the homeless who were seeking shelter (City of San Jose Stormwater Annual Report, 2021-2022). The city developed and implemented a motel voucher program that prioritized families and couples (City of San Jose Stormwater Annual Report, 2021-2022). The city also provided shelter for families with children with one of the emergency interim housing sites (City of San Jose Stormwater Annual Report, 2021-2022). Lastly, the City of San Jose applied for Project Homekey funding to convert two hotels into housing (City of San Jose Stormwater Annual Report, 2021-2022).

Conclusion

As stated above, the City of San Jose began to increase their collaboration among city departments, non-profits, and governmental agencies that participate in creek cleanups and encampment abatements. They offered social services and housing placements, at least for temporary tiny homes, to the homeless people being moved from the creek banks. They also offered sanitation and trash receptacles at homeless encampments. Due to the high number of homelessness inhabitants, and the amount of trash along waterways, the City of San Jose will have to continue its trash abatement efforts to keep the waterways clean and healthy for years to come.

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