SANTA CRUZ COUNTY MOSQUITO & VECTOR CONTROL

AGRICULTURAL COMMISSIONER'S OFFICE

ANNUAL REPORT

2020

MANAGER'S STATEMENT

This year brought challenges and change, but above all—a great appreciation for our team's adaptability, creativity, and maintained quality of service. The COVID-19 pandemic altered each of our lives, as well as the way we conduct business as an agency; however, no amount of plexiglass could change our dedication to public service. Our staff adapted quickly to remote work, providing in-depth remote consultations, contactless insect identification, and socially-distanced inspections and treatments for the County and its residents.

In August, our community was struck by the CZU Lightning Complex wild fires that devastated neighborhoods in our northern mountains, abruptly changing landscapes and hightening the potential for mosquito production. Staff were quick to respond to the public's needs through Disaster Service Work and provided mosquito inspections and treatments for structures and pools that remained. Although we have yet to see the full vector-related impacts of these fires, we continue to be a resource for the burn-affected communities during recovery efforts.

2020 was also a year of considerable staff changes. Paul Binding retired after a remarkable 25 years of service as the Manager for Santa Cruz County Mosquito & Vector Control. Paul led with heart-felt dedication to his staff and the community, as well as a great enthusiasm for where entomology, public health, and public service collide. As we bid Paul a happy retirement, we welcomed Emma McDonough as our new Vector Ecologist. With a background in Agricultural Entomology and a passion for public service, she has been a motivated and exciting addition to the team. In October, I started as the new Manager after working under Paul Binding for four years and spending my academic and professional career in environmental science, vector-borne disease ecology, and Mosquito & Vector Control agencies throughout the Bay Area.

In my first year as manager, I feel grateful for our team and immensely proud of their accomplishments throughout this difficult year. This year has taught me that change brings about new growth. In all that was destroyed by the fires, an opportunity was born to study tick and fire-ecology through a collaborative project with UC Davis. The need to work remotely led us to explore drone technology for mosquito surveillance and control, which will lessen our environmental impact in years to come. I am hopeful for our future and confident we will continue to tailor our services and protect public health in our community.

Amanda Poulsen

AMANDA POULSEN

Juan Hidalgo
Agricultural Commissioner

Amanda Poulsen
Assistant Manager

Ray Travers
Vector Control Specialist

Nader Sidhom
Vector Control Specialist

Steve Driscoll
Vector Control Specialist

Stephen Bowling
Vector Control Specialist

Emma R. McDonough
Vector Ecologist

Jessie Hagelshaw
Student Worker

Mark Dingler
Seasonal Aide

Grayson Jordan
Seasonal Aide

OUR MISSION

Santa Cruz County Mosquito & Vector Control (MVC) is committed to protecting the public from pests capable of transmitting disease or creating a nuisance. Our service, consultation, and education, enable residents to resolve problems and protect themselves with a better understanding of vector biology, behavior, and vector-borne diseases.

MVC was established in 1993 as a County Service Area program within the Agricultural Commissioner's Office in response to public interest in mosquito relief. In August 2005, residents voted to enhance our services to include other vectors, as well as expand our service area to the entire county (446 square miles, population 273,000).

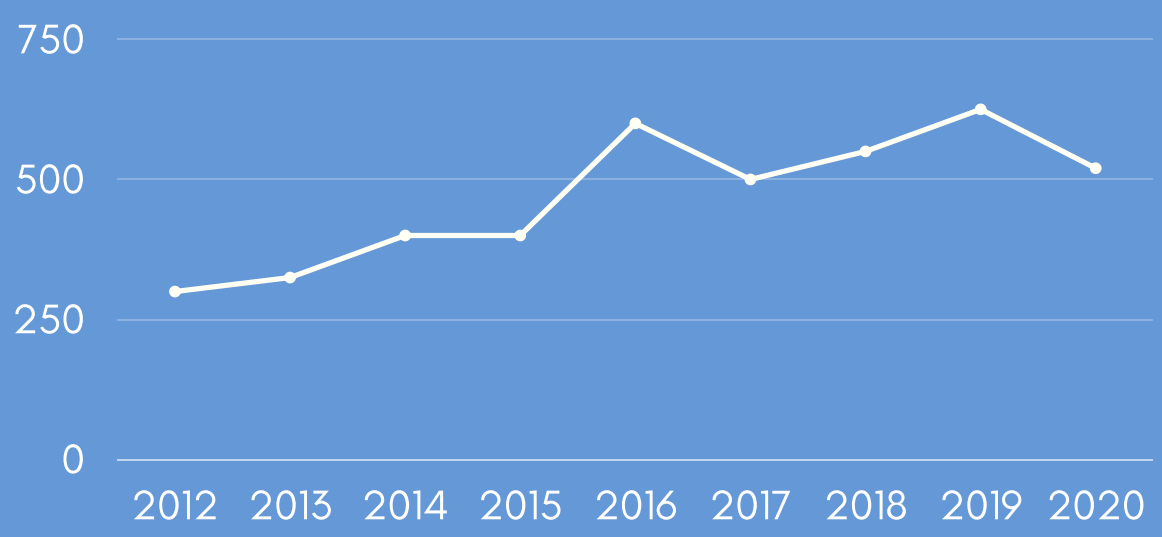


FIGURE 1.

MVC's Requests for Service have increased by 70% since 2012.

FREE SERVICES

SCCMVC PROVIDES:

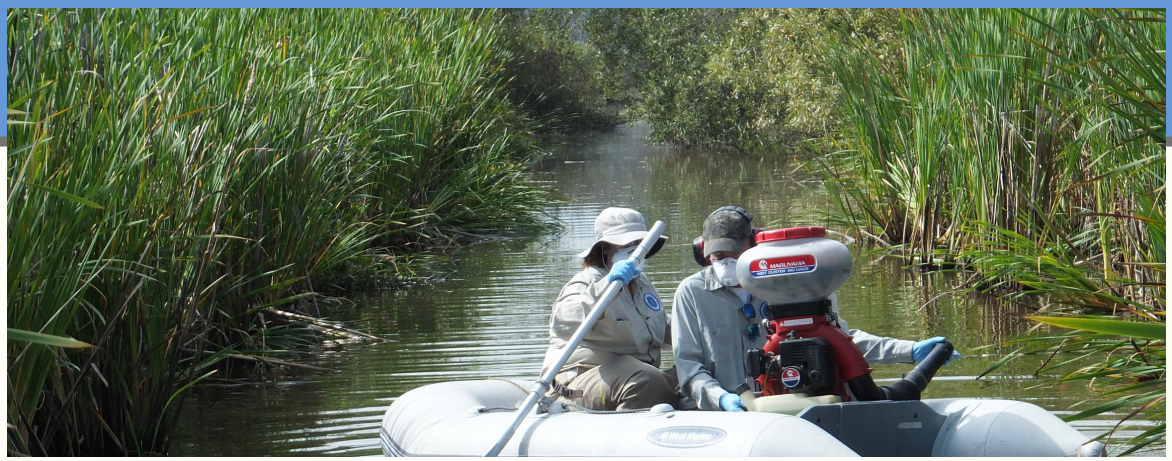
- Mosquito control and disease surveillance.
- Mosquito fish for ponds, animal troughs, fountains, and unused pools.
- Tick surveillance and disease monitoring.
- Control of yellow jacket wasps in public areas.
- Rodent Inspections for homes and businesses.
- Advice on bees, wasps, ticks, rodents, bats, raccoons, flies, bed bugs, mites, head lice, fleas, and other pests.
- Public Education about vector biology and control.

519 SERVICE REQUESTS

MVC responded to 519 requests for service in 2020. Nearly half of the service calls involved mosquitoes (including requests for mosquito-eating fish). A quarter of requests regarded rodents, while ticks, wasps, and other invertebrates made up the remainder. Others included mites, fleas, bedbugs, spiders, and unknown parasites (Fig. 2)

PESTHELP@AGDEPT.COM (831)454-2590
WWW.AGDEPT.COM/MVC.HTML

Mosquito Control

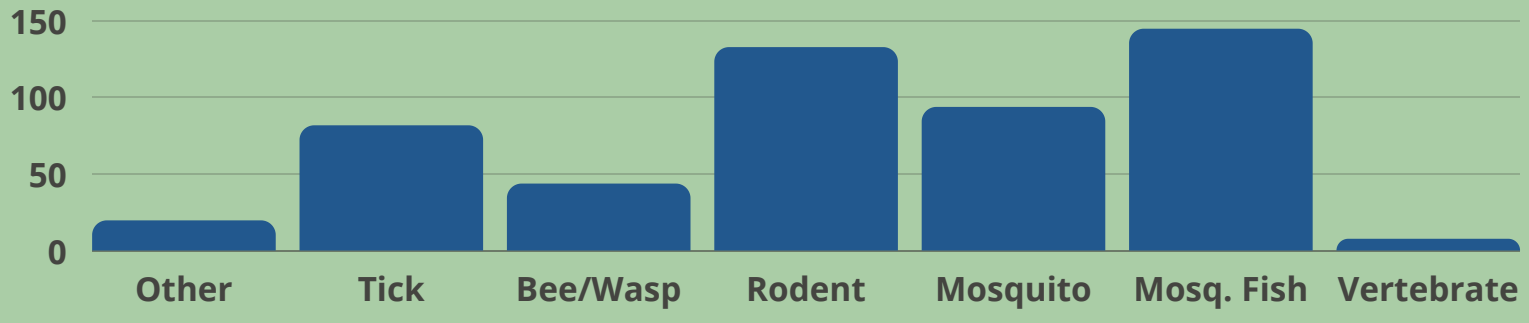


Decisions to control mosquitoes are based on their species, quantity, disease potential, proximity to humans, and the presence of natural predators or protected wildlife species.

Minimizing mosquito breeding potential is paramount to mosquito control. We provide water management advice to residents, stock mosquito-eating fish for backyard ponds, and consult on new development projects in the County. If mosquito breeding in an area reaches intervention thresholds, we apply low-toxicity larvicides to the water so the mosquito larvae do not develop into adults. When controlling mosquitoes in the larval stage is not feasible, as with adult tree-hole breeding mosquitoes, we employ other methods like applying garlic oil-based sugar bait barrier treatments to shrubbery.

Targeting adult mosquitoes is a last resort for our program, as control of larvae is more selective and efficient. Wide area spraying (the dispersal of products via micro- droplets into the air) is not part of our current program and would require approval by the County Board of Supervisors as part of the Emergency Disease Response Plan.

Figure 2. 2020 Service Request Types



WHERE DO MOSQUITOES COME FROM?

Mosquitoes come from natural and man-made sources of standing water. Unlike natural water sources, man-made containers lack natural predators and are prone to stagnation. This creates a nutrient-rich breeding environment capable of breeding over 1,000 mosquito larvae per square foot. Invasive mosquito species *Aedes aegypti* and *Aedes albopictus* (not yet in our county) prefer to breed in small man-made containers and can transmit life-threatening diseases.

Residential sources of standing water may harbor mosquitoes in even the smallest pockets of water. Drains, planters, fountains, tires, and tarps can become breeding sources for disease-carrying mosquitoes. Septic Tanks with unsealed lids are responsible for mosquito problems in many neighborhoods. They often harbor *Culex pipiens*, human vector of West Nile virus, which readily enters homes and bites only at night.

2020 MOSQUITO TRAPPING

Carbon dioxide (CO2) baited traps were used to collect adult mosquitoes for population and disease monitoring. Over 500 CO2- baited traps were deployed from April to November 2020, in which a total of 23,121 adult mosquitoes were captured. Weekly trap data enables our staff to focus our mosquito control activity on high-risk areas.

Of the species in our county capable of transmitting West Nile Virus (WNv) to humans, *Culex pipiens* made up 6% (n = 1,414) and *Culex tarsalis* made up 2% (n = 449) of all mosquitoes caught. *Culex erythrothorax*, the Tule mosquito, were the most numerous as they made up 80% (n=18,399) of total mosquitoes caught (Fig. 3). Tule mosquitoes can be a biting nuisance near their marsh sources and spread WNv between birds, but are not considered competent disease vectors to humans.

Figure 4.

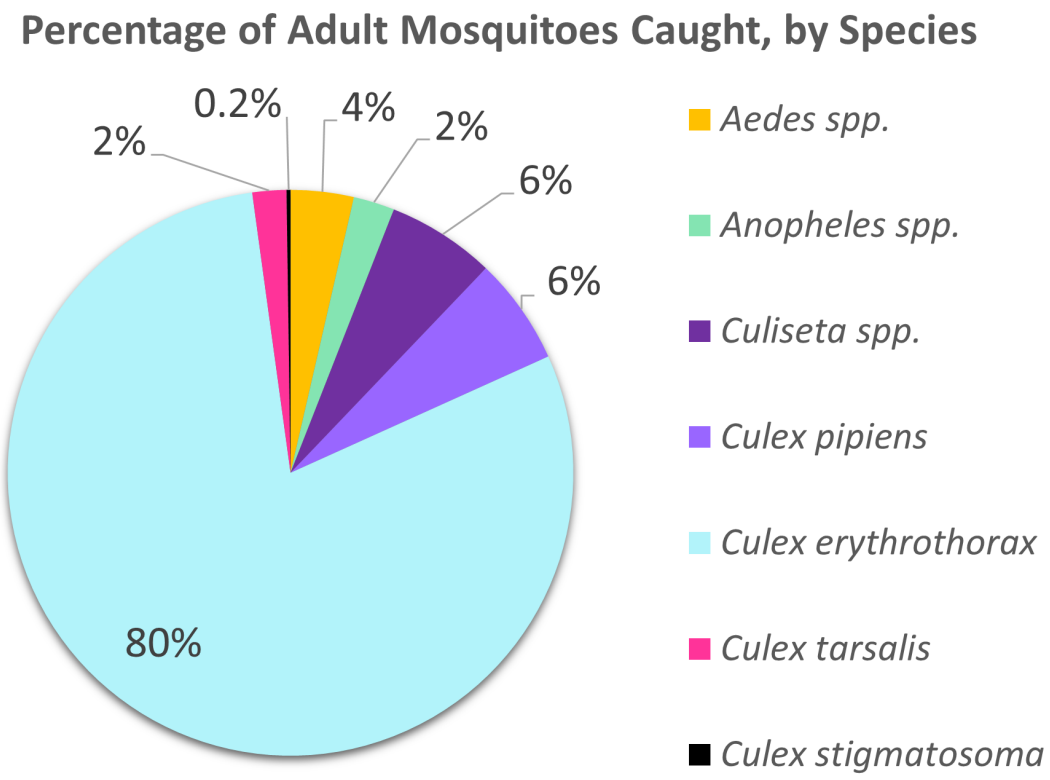


Figure 3.

THE DANGER OF INVASIVE MOSQUITOES

The Yellow Fever mosquito, Asian Tiger mosquito, and Australian Backyard mosquito (vectors of Zika virus, Dengue, Chikungunya, and Dog Heartworm) are currently established in California. While some of these invasive *Aedes* species remain as near as Merced, Fresno, and Stanislaus counties, none were detected in Santa Cruz county in 2020.

Residents call us to report mosquito biting activity, container-cluttered yards, green swimming pools, and other breeding sources in their neighborhoods for assistance in managing and eliminating them. We collaborate with the County Health Department to track mosquito-borne disease cases and use the statewide surveillance database CalSurv© to track invasive *Aedes* found in the state.

In2Care® traps were used for the first time in 2020 in three Santa Cruz cemeteries to monitor for invasive *Aedes* (Fig. 4). Cemeteries were chosen as they provide excellent breeding sources for container-breeding species like invasive *Aedes*. These traps function with the combined use of a growth regulator and parasitic fungus. Multiple larval samples were taken and observed in our lab, and results proved the trap to be 100% effective at inhibiting adult emergence. We plan to continue the use of these traps in our Invasive Aedes Response Plan.

WEST NILE VIRUS

While most West Nile virus (WNv) infections are mild, neuro invasive WNv infections can cause permanent neurological damage. There is no human vaccine, treatment is expensive, and recovery can take up to several months. Santa Cruz had no reported human cases of West Nile virus (WNv) in 2020. WNv activity is typically lower in coastal areas due to lower average temperatures, which are less conducive to the amplification of WNv. Sixty pools containing 1,120 mosquitoes were tested and none were positive for WNv or any other mosquito virus. 168 blood samples from sentinel chickens, hosted by Watsonville and San Lorenzo Valley High Schools, tested negative for WNv. Seventy-nine dead birds were reported by the public for WNv testing. Only 23 were testable condition and, of those, none tested positive for WNv.

TICKS & LYME DISEASE

In 2020, there were 14 confirmed cases of human Lyme disease in Santa Cruz County, making it our most important vector-borne disease. Lyme disease is transmitted by the bite of an infected Western Black-Legged tick, I*xodes pacificus* (Fig. 5). For an interactive map and more information, please visit the CDC site at:
https://storymaps.arcgis.com/stories/f64d0c19a3ab42cf90e8ce38397e96e0

MVC provides tick species identification and Lyme testing resources to the public. In light of 2020's social distancing requirements, we expanded our services to include photo ID of ticks sent in via email. Our partners at the California Department of Public Health and UC Davis support us in testing ticks for various pathogens. We post warning signs in public areas of high tick exposure, and sample for species diversity and abundance in recreational areas throughout Santa Cruz County.

Other species of ticks can be found in Santa Cruz County, such as the American Dog tick, and the Pacific Coast tick. These ticks can also transmit diseases such as Rocky Mountain Spotted Fever, Pacific Coast Tick Fever, and Tularemia. Swift removal of the tick is advised, even though these diseases are rarer than Lyme disease. Always check yourself and pets for ticks after being outdoors, hike in the middle of the trail, and use repellents when appropriate.

Fig. 5

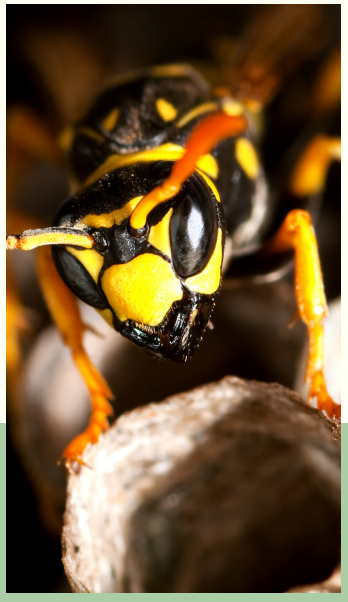
RODENTS, WASPS, & COCKROACHES

Rodents

Free exterior rodent inspections and consultations are offered for homes, businesses, and new development projects. Rodents and their ectoparasites can spread many diseases to humans including: Plague, Salmonellosis, Tularemia, Rat-Bite Fever, Leptospirosis, Hantavirus Pulmonary Syndrome, and more. Rodent control should be taken seriously as they can also destroy personal property and cause fires by chewing on wires.

Exclusion and sanitation are the foremost means of preventing rodent activity in the home. Twenty five percent of our requests for service in 2020 regarded rodents, primarily rats. Our staff performed 132 rodent inspections this year, an increase of over 300% since 2015.

Wasps



Yellow Jacket wasps are controlled when they present a danger in public areas. Eight percent of requests for service received in 2020 were for yellow jacket wasps. We can not control honeybees, but do refer residents with wild hives and swarms to beekeepers.

Cockroaches

We assisted County Public Works, Sewer and Water Division in controlling American cockroach infestations in sewer systems in the county, effectively treating manholes with a growth regulating bait. American cockroaches typically live in sewers and drains; however, they can inhabit structures where food is stored. Cockroaches can contaminate food with bacteria, resulting in food poisoning, dysentery, and diarrhea. Cockroaches can cause childhood asthma and allergies, produce an unpleasant odor, and damage property.

IN THE LAB:

Pathogen testing was conducted by the UC Davis Arbovirus Research and Training at the University of California, Davis, or the California Department of Public Health, Vector Borne Disease Division in Richmond, California. **In 2020:**

- **23,121** adult mosquitoes were collected and identified to species in our lab.
- **0** out of **60** pools of adult mosquitoes tested positive for West Nile virus (WNv), St. Louis Encephalitis virus (SLEv), and Western Equine Encephalitis virus (WEEv).
- **0** out of **23** dead birds tested positive for WNv.
- **168** sentinel chicken blood samples tested **negative** for WNv, WEEv, and SLEv.
- **286** larval samples from specialized Invasive Aedes traps were inspected; invasive *Aedes* were **not** detected.
- Several ticks, mites, bedbugs, and insects were identified for the public in our lab.
- Public education on vector biology and control.
- Several vector-borne disease public service announcements.

INTEGRATED PEST MANAGEMENT

MVC takes an Integrated Pest Management (IPM) approach to mosquito control, minimizing impact on the environment and non-target organisms. When managing breeding sources in our neighborhoods, we use both biological and physical control methods whenever possible. If public health is at risk, our CDPH certified Vector Control Technicians apply selective EPA-registered materials, many of which are microbial and OMRI certified organic.

Here at MVC, we:

- Use Bio-control with mosquito eating fish in contained water features.
- Provide water management techniques to property owners.
- Prioritize the least toxic means of pest reduction.
- Consider disease risk, resident proximity, ecosystem diversity, and environmental safety when treating breeding sources.
- Control mosquitoes in their aquatic larval stage, prior to emergence of the adult stage.
- Use sustainable treatments when mosquitoes exceed public health thresholds.
- Prevent pesticide resistance by rotating products.

MOSQUITO FISH

Free Mosquito-eating Fish are available by **Pick-up** or **Delivery!**

Mosquito fish (*Gambusia affinis*) provide excellent control of mosquitoes in many situations. Their use in Santa Cruz County pre-dates our program, having been established statewide for several decades.

MVC cooperates with wildlife management agencies by not introducing mosquitofish into natural water bodies where they may compete with native fish and amphibians. They are stocked in yard containers such as fountains, animal water troughs, fishponds, and unmaintained pools.

(831) 454-2590
640 Capitola Rd.
Santa Cruz, CA 95076

Monday – Friday
8:00AM–4:00PM

FINANCIAL ASPECTS

SCCMVC provides free services funded by a tax assessment that appears on your property bill. For rates, please visit our website: www.agdept.com/mvc.html

For the MVC budget, see the County website under "Budget and Financial Reports". For 2020-21 see pages 35-36 and 285-286.

COOPERATION WITH OTHER AGENCIES

• MVC cooperates with the Santa Cruz County Integrated Pest Management Departmental Advisory Group and receives oversight from the CA Department of Public Health and the Agricultural Commissioner.

• MVC applies aquatic larvicides under a National Pollution Discharge Elimination System permit as required in waters of the United States, and reports use to the State Water Resources Control Board (WRCB) and County Agricultural Commissioner. MVC has a Mosquito Management Plan on file with WRCB, state and federal Fish and Wildlife agencies. We comply with Water Quality Control Board requirements for water resource protection.

• Cooperative Agreement with the CA Department of Public Health agreeing to maintain application and calibration records, certifications and continuing education, to follow pesticide labeling and report adverse effects, and be subject to inspections.

• In collaboration with our Public Works Department, we continued to apply for and receive CalRecycle funds for bi-annual Tire Amnesty Grants. Since we received our second two-year grant from CalRecycle, residents were able to recycle over 4,000 waste tires free of charge. This was a significant reduction in mosquito sources, as well as reduction in environmental pollution.