COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH

VECTOR CONTROL PROGRAM

ANNUAL REPORT
CALENDAR YEAR 2004

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Vector Control Program

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I. INTRODUCTION

The Vector Control Program (VCP) has been protecting the public's health from disease carrying vectors for over 30 years. Since July 1, 1989, the Vector Control Program (VCP) of the County Department of Environmental Health (DEH) has provided countywide vector prevention and control services under the powers of a vector control district, as adopted by the County Board of Supervisors.

VCP core functions include:

1. Early detection of public health threats through comprehensive vector **surveillance.**
2. Protection of public health by **control**ling vectors or exposure to vectors that transmit diseases to humans.
3. Timely **response** to customer requests to prevent/control vectorborne diseases

Mosquito, domestic rat, fly and other vector detection and control programs are provided to reduce the risk of diseases these vectors can transmit and to minimize nuisances. A vector is any insect, rodent or animal capable of transmitting human disease or causing human discomfort or injury. Surveillance is critical to detecting known and emerging pathogens in the environment prior to human outbreaks of disease. Likewise, a comprehensive control program should be in place to quickly respond to complaints, conduct follow-up on complaints, and regularly inspect and treat known breeding sources.

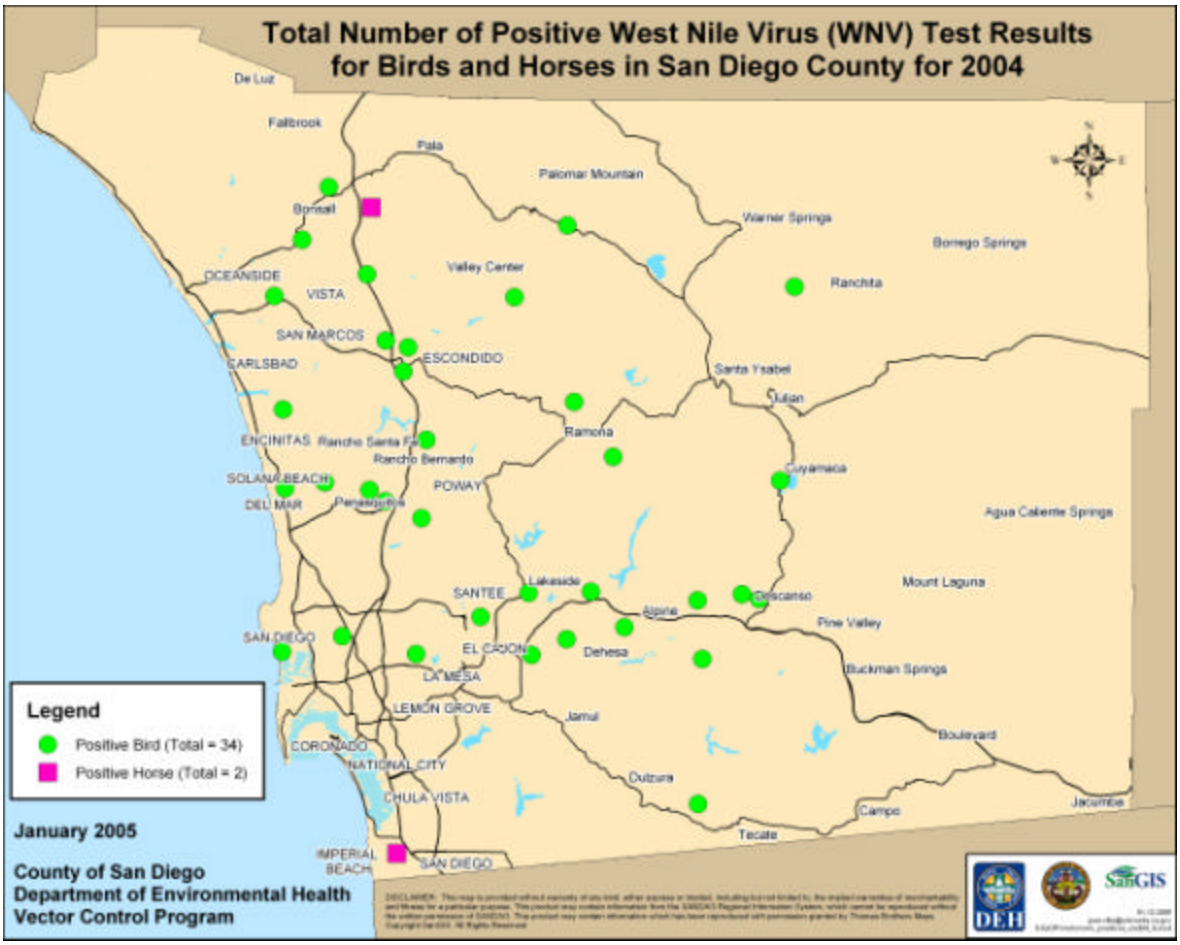
This report describes the activities of VCP during the past year and forecasts anticipated events in the near future.

II. SURVEILLANCE

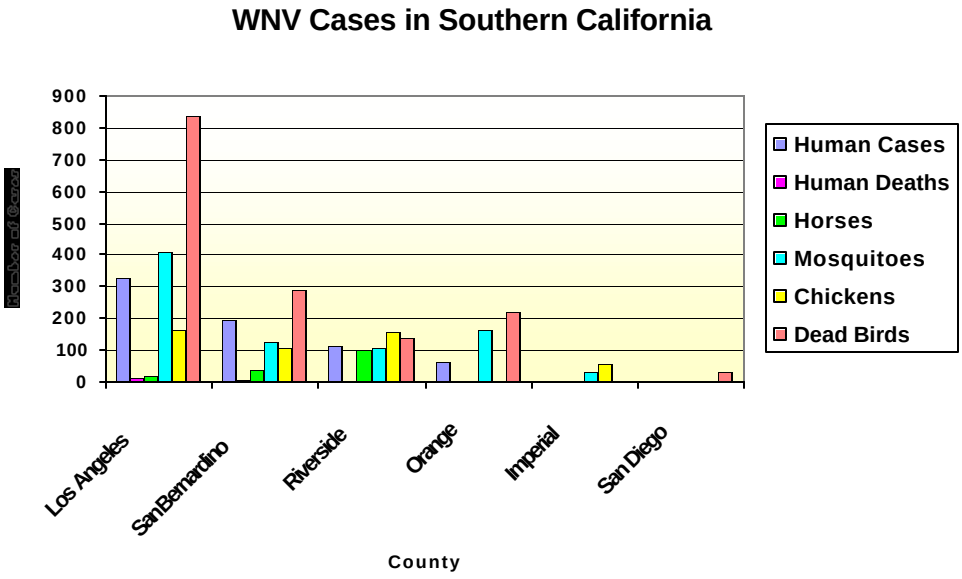
A. Mosquito

In 2003 the Board of Supervisors adopted the West Nile Virus Strategic Response Plan (Plan), to establish an organized and planned response to the virus in the county. The Plan was updated in 2004 to provide updated information and address the potential use of adulticides, if determined necessary. The completed the Plan is posted on the website at www.sdfitethebite.com.

In 2003 West Nile virus (WNV) was discovered in San Diego County with five dead birds and one horse testing positive for WNV in October and November. In 2004 WNV was found in 34 dead birds with a broad distribution throughout the county. Two horses acquired the virus, one in the Bonsall area and the other in the Tijuana River Valley. The map below plots these positive findings. Three sentinel chicken flocks, each holding 10 chickens, were tested biweekly with no positive findings. According to State reports San Diego County had two human WNV cases, but one was acquired in Los Angeles County and it could not be determined where the other victim acquired the virus.

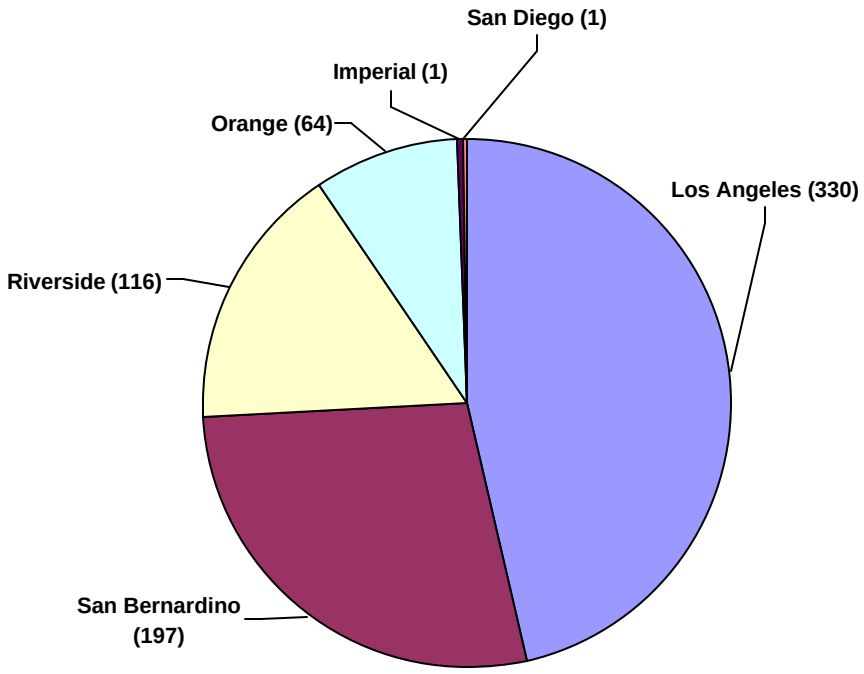


Statewide there were 829 human illnesses and 27 fatalities, with the majority of cases in Southern California. The table below shows the number of positive virus results for Southern California Counties.



The next chart shows the proportional number of illnesses in San Diego County as compared to other Southern California counties.

WNV Human Cases in Southern California



Dead bird testing was the most valuable surveillance tool in early detection of West Nile virus in the county and State. In 2003, 213 dead birds were tested with five positive results. In 2004, 343 dead birds were tested with 34 found positive for the virus. The positive dead birds were fairly evenly distributed across the county, but there were a couple of areas that had clusters of positive dead birds, in Rancho Bernardo/Poway and Escondido areas. Extensive mosquito trapping was conducted in these two areas to search for mosquito breeding sources. While mapping of dead bird locations and trapping concentrations of dead birds are good investigatory tools, we found no significant mosquito breeding sources.

In 2003 mosquito trapping and testing increased by 200%, with 98 pools tested. In 2004, 92 mosquito pools were tested with none testing positive. While more traps were set in 2004 than 2003, fewer mosquitoes were found in the traps. The laboratory needs 25 to 50 mosquitoes to constitute a "pool". Due in a large part to the very effective aerial applications, much of the trapping did not result in enough mosquitoes to constitute a pool. Field Technicians discovered mosquito breeding during their complaint investigations and inspection of known sources but trapping was not possible since they treated the breeding to stop mosquitoes from maturing to the adult phase.

New surveillance devices called “gravid traps” were used in 2004 but none resulted in positive results. Other vector control programs use these devices effectively to capture mosquitoes from fixed structures such as storm drain systems. Assistance from the cities is needed to find mosquito-breeding locations where the traps can be secured.

Testing for West Nile virus would have also detected the presence of Western Equine Encephalitis and St. Louis Encephalitis but none of these other arbo-viruses were detected.

B. Rodent

Since the arrival of WNV in the county, surveillance and control efforts have been shifted from rodents to mosquitoes. Given the limited number of surveillance staff, this resulted in a reduction of other surveillance activities in 2004, such as plague, hantavirus, arenavirus, and tick-borne diseases.

Plague. No human cases of plague were reported in San Diego County during 2004. Plague infected fleas bite and infect a rodent, usually ground squirrels, and these rodents can act as reservoirs. Humans and their pets, when visiting campgrounds or other rural areas, can be infected by being bitten by infected fleas. Squirrels are routinely tested at campgrounds by collecting blood samples and sending them for plague testing. During 2004, 73 ground squirrels were sampled with none testing positive. This was a 70% reduction in plague surveillance, as compared to 2003, when 239 squirrels were tested. Plague surveillance has been conducted at higher localities and has consistently yielded one to four plague-seropositive ground squirrels on a yearly basis.

Hantavirus. The first locally acquired human case of hantavirus was reported in San Diego County history during 2004 in Campo. Extensive trapping and testing was conducted at the locations where the victim may have acquired the illness. The positive source was located and staff assisted the property owner with clean up of old mouse droppings and urine.

During 2004, 167 mice were sampled and 12 tested positive for hantavirus. In addition to the Campo area, positives were found in Otay Lakes, Carlsbad/Palomar Airport Road, Penasquitos Canyon and Black Mountain Park. Both the hemorrhagic and respiratory strains of hantavirus occur in rodents in San Diego County. Humans typically become infected with hantavirus by breathing air-borne particles of wild rodent droppings contaminated with the virus. Most human cases occur when people open up and occupy mountain cabins or other small-enclosed structures, which are infested with wild mice. VCP has created a site on it’s webpage to inform residents how to properly cleanup mouse droppings to help prevent them from acquiring hantavirus.

Arenavirus. This virus has been found in wild rodents in South America and in wood rats, *Neotoma* spp., in the southwestern portion of the United States. The virus is transmitted to humans in a similar fashion to Hantavirus, which is described above. To date, three people in California have died after becoming infected with arenavirus. In 2004, 8 wood rats were sampled with one testing positive. When seropositive rats are found, the site is re-sampled to determine the prevalence of the virus in the rat population, and is posted with animal caution signs.

C. Tick

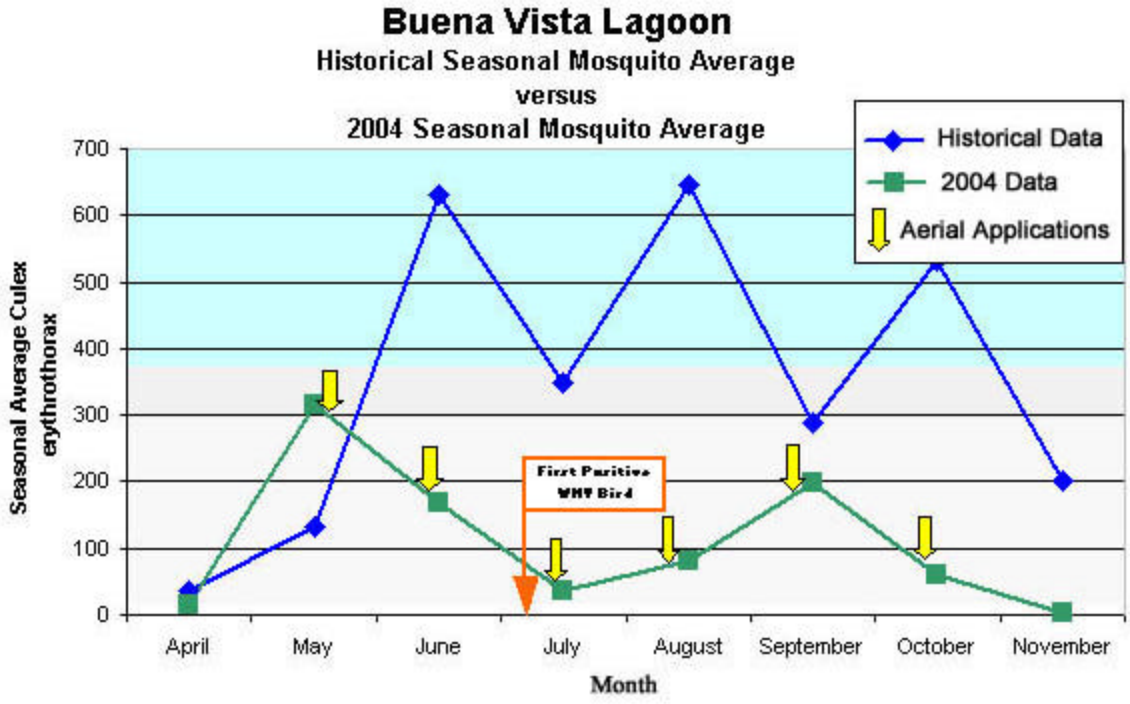
Tularemia. In 2004, 2,099 ticks were collected with 233 pools submitted for testing. There were no positive results.

Lyme Disease. Testing ticks in 1994 and 1995 demonstrated that Lyme disease does occur in San Diego County, but there have been no positive ticks since 1995. The primary vector for this disease, the western blacklegged tick, is commonly found in most rural areas of the county. Four to five percent of these ticks were shown to be infected. During 2004, 17 pools representing approximately 150 specimens of ticks from 12 localities were sent for testing. These were negative for the Lyme disease. Camp rangers, docent education programs, and other agencies have aided VCP in posting tick warning signs, and in providing information to visitors to outdoor recreational areas regarding precautions and personal inspection techniques that can be used to avoid exposure to this and other tick-borne diseases.

III. CONTROL

A. Mosquito

While all surveillance, control and outreach efforts contributed to minimizing the impacts of the virus on the County, the monthly aerial applications of larvicides were significant in reducing mosquito breeding. Aerial applications conducted in 2003 revealed that the larvicides remained effective for four weeks. Based on this finding, in May 2004 VCP started monthly aerial applications of larvicides at 27 historic mosquito breeding sites that continued through October. The aerial applications were effective in reducing mosquito populations by 90%. The graph below demonstrates the dramatic reduction in mosquito breeding. West Nile virus is primarily a bird disease and by reducing the bird to bird transmission of the virus the aerial applications prevented a magnification of the virus in the bird population, thereby minimizing its potential for spread to humans.



In addition to these positive results, federal and state wildlife officials have deemed helicopter applications appropriate. Use of the helicopter is far less invasive to sensitive habitats than efforts by VCP staff conducting land treatment.

To prevent and control mosquitoes, the VCP conducts inspections, and identifies mosquito breeding sources at approximately 1,000 breeding sources. The sources include both private and public ownership of rivers, streams, marshlands, lagoons, ponds, and various other man-made and natural sources of standing water. During 2004, additional mosquito breeding sources have been identified using the assessor's parcel number. Property ownership enables VCP staff to better enforce the property owner's responsibility to manage/ maintain water that stands for more than 72 hours. Ownership of mosquito breeding sources has been mapped using Graphic Information Systems (GIS). This assists VCP by identifying and stopping adult mosquito production and is vital in combating mosquito-borne diseases like WNV.

Mosquito fish are natural predators of mosquitoes and VCP rears them in large tanks. Field Technicians place mosquito fish in man-made settings in response to finding larvae. In addition VCP has given residents free fish from our Hazard Way office. In 2004 additional sites are being offered where the public can more easily pickup mosquito fish. We increased the number of Mosquito Fish distribution sites from one location in Kearney Mesa, to 12 locations evenly distributed throughout the county. Each of these locations, including County parks, pet stores and nurseries, featured an educational display, and are promoted on the website and in the media.

Additional mosquito breeding source reduction efforts involve working with city Planning and Public Works departments to ensure new construction of storm-water Best Management Practices (BMP) are built and maintained so they will not breed mosquitoes. During the permitting process, VCP reviews plans for the construction of BMP's and will incorporate conditions in permits for BMP's and constructed wetlands that will enable VCP to require proper maintenance to prevent mosquito breeding and recoup our costs.

Outreach

Health education, outreach, and raising awareness in the County are all integral parts of the West Nile Virus Strategic Response Plan. In 2004, we dramatically increased our outreach efforts. We took an aggressive proactive approach to educating County residents about the risk of WNV, and preventative measures they can take to protect themselves and their communities.

We distributed educational materials at more than 560 locations such as all public libraries, public health centers, County public counters, homeless shelters, WIC offices, and city halls throughout the County. We produced and distributed over 82,000 WNV brochures (58,000 English and 24,000 Spanish). Additionally, we developed and distributed nearly 400 copies of a County Television Network-produced WNV video to community clinics, libraries, high schools, and community groups.

The County's WNV website, www.SDFightTheBite.com, was further developed and improved to provide valuable, up-to-date information for residents about personal protection, eliminating mosquito breeding around their homes, and status of WNV on the federal, state, and local levels.

Press releases, press conferences and media events were all utilized to help deliver WNV prevention information. In addition, we distributed Public Service Announcements to television stations and made links to them available on our website.

In 2005, we plan to expand our education efforts to:

- Increase media coverage as the most effective means to convey the message
- Target high risk and underserved populations
- Increase outreach to senior centers, schools and special interest groups
- Distribute a Spanish WNV video
- Distribute an abbreviated version of the English video
- Distribute WNV bookmarks
- Distribute WNV house poster
- Create an ad to be included in the Registrar of Voters Handbook
- Create and distribute news articles for inclusion in community newsletters
- Enhance the www.sdfightthebite.com website

B Domestic Rat

The practice of providing rodenticide bait to residents was discontinued in 2003 due to liability issues. Improper placement of the bait by the resident has raised concerns for the safety of animals and children. VCP continues providing inspections and consultations and on how residents can exclude rodents from their homes along with guidelines for securing and placing resident-purchased bait stations. VCP staff coordinated work with other regional agencies to prevent and eliminate rat infestations and harborages.

VCP is working with the County Television Network to develop a video that will assist homeowners in excluding rats from their homes and instruct them in how to property trap and bait for rats. The video will give VCP an outstanding educational tool.

B. Fly

In 2004, 30 poultry ranches were in operation in San Diego County. Six Notices of Violation were issued to poultry ranches and the violations were immediately corrected. One Notice to Abate was issued by the Fly Abatement Appeals Board due to the operator's failure to comply with a Notice of Violation. The operator did eventually comply. Also in 2004, members of the Fly Abatement and Appeals Board met twice to discuss industry issues and provide guidance to the program.

IV. RESPONSE

A. Mosquito

In 2004, staff responded to 2532 citizen complaints or service requests regarding mosquito nuisances and breeding. This is a 12% over last year and a 317% increase since 2002. While many complaints involved major sources, most involved smaller or intermittent backyard sources. VCP staff has been shifted to mosquito control from rodent control efforts to respond to complaints.

B. Domestic Rat

In 2003, VCP staff responded to 2,317 citizen complaints or service requests relating to domestic rats. VCP staff attempted to perform phone consultations for service requested when possible, to reduce the time spent on rat complaints and free up more time to respond to mosquito complaints.

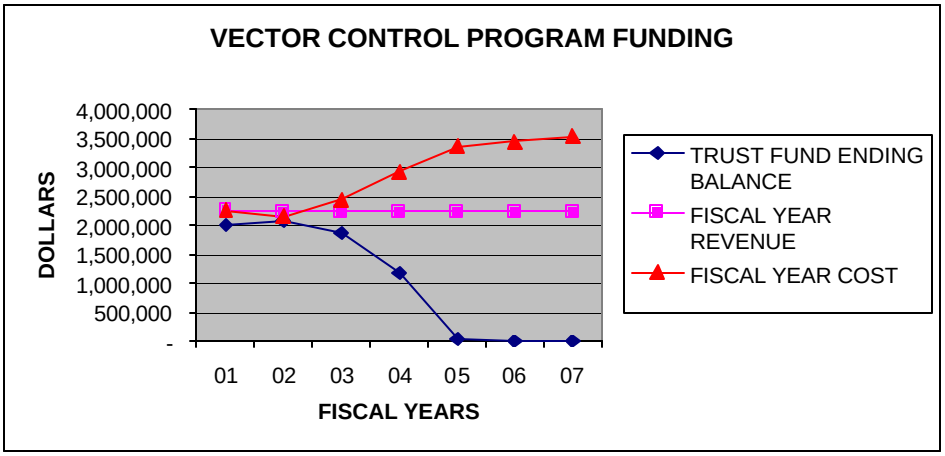
C. Fly

VCP responded to 313 citizen complaints of excessive numbers of nuisance flies during 2003. Of these complaints 223 involved commercial poultry ranches. VCP responds to residential complaints relating to houseflies and lesser houseflies as opposed to agricultural operations with associated fruit flies.

VII. PROGRAM FUNDING

Since 1989 the funding for VCP has been a service charge levied against all parcels in the county. In subsequent years the Board of Supervisors created three regions, Coastal, Inland Suburban and Inland Urban. When Proposition 218 was passed in 1996 it froze our service charge at $3.00 for the Coastal Region and $2.28 in both Inland Regions. Proposition 218 requires a demonstration that services are a benefit to a property before a mail out ballot is sent to all property owners for their vote on a new assessment against a property.

A Trust Account was created for unspent service charge revenues. With that fixed revenue stream VCP has been exhausting the Trust Account. Response to West Nile virus has escalated the depletion of the Trust Account two to three years earlier than anticipated. VCP will exhaust its trust account in FY 05-06 and experience a shortfall in revenue of $1.2 Million, as illustrated by the following graph:



Response to West Nile virus required a shift in staff and fiscal resources causing a reduction in other public health protective measures. Surveillance for hantavirus, plague and tickborne diseases was reduced and phone consultations for many rat service requests were substituted for the preferred field response. As this report demonstrates surveillance, complaints and outreach efforts for West Nile virus and mosquito control dramatically increased.

The CAO's office directed VCP to conduct a zero based study of public health protection and services provided. VCP conducted a time study for each staff person, determining the time

needed for complaints, setting traps, treating breeding sources, etc. Benchmarking of service levels was conducted using vector control programs in Orange County, Minnesota Metropolitan Mosquito Control District, Harris County (Houston), Texas, and Marin/Sonoma counties as comparisons. Using the time study and benchmarked level of services, staffing levels were determined and a budget was developed. The Benchmarking study, which includes service levels, staffing and budget is attached to this report.

A major component to the staffing plan is to use seasonal staff to meet peak workload needs during the mosquito breeding season, April through October. Seasonal staff can perform certain functions under the direction of VCP certified Technicians. There is considerable cost savings using seasonal staff since they receive no benefits and we only need their services for half the year.

The following is basic overview of the new budget:

Operating budget		$ 7.2 million
One-time costs		$ 2.3 million
• BA repayment	$.8 million	
• Emergency Response fund	$1 million	
• Vehicles, building	$.5 million	
Total Budget		$ 9.5 million
Revenue from Service Charge		$ 2.2 million
Costs funded by Benefit Assessment		$ 7.3 million

The Proposition 218 benefit assessment process is the only option to make VCP a viable and sustainable program. A consultant has been hired to prepare an Engineer's report, which will both demonstrate the benefit of vector control service to parcel owners and will allocate a cost for the services to each parcel. The Engineer's Report is being finalized but based on preliminary estimates the cost for the typical single family home will be $8.80 per year, in addition to their current service charge of $3.00 or $2.28. The apportionment of assessment costs is related to the number of people who potentially live on, work at, visit or otherwise use the property. Once the Engineer's Report is final it will placed on VCP's webpage at www.sandiegobugs.org.

A survey was conducted of 15,000 property owners to determine the level of service they desired and costs they are willing to pay for vector control services. They were asked if they would support an increased cost of $3.00, $6.75 or $10.50. Of the 21% that responded to the survey, 73% indicated they would support a $3.00 or $6.75 increase and 62% advised they would support a $10.50 increase. The estimated rate of $8.80 is well within the support levels of the survey to gain 50%+1 needed of those returning their ballots for passage of the benefit assessment.

We are requesting that the Board of Supervisors initiate the benefit assessment process on March 23, 2005. The following timeline identifies key dates in the process.

Vector Ad Hoc Committee	February 28, 2005
Community Meetings (Chula Vista & Oceanside)	March 1 & 3, 2005
Board hearing	March 23, 2005
Ballot preparation and communication strategy	March - May 2005
Ballots mailed	May 6, 2005
Board hearing to initiate vote count	June 22, 2005
Board resumes hearing and announces results	July 13, 2005
VCP receives funding from new Benefit Assessment	January 2006

Benefits of New Program

With the new service levels VCP will be able to provide the following public health protection and customer service to county residents:

- Surveillance for plague, hantavirus at levels that will detect disease in vectors
- Increase in mosquito surveillance to meet the needs for detection of West Nile virus
- Continued effective monthly aerial application of larvicides
- Inspect and treat 1,000+ known breeding sources monthly
- Respond to complaints within 3 days instead of 8 days
- Reinstate field response to rat complaints
- Continuation and expansion of aggressive outreach program
- Proactive efforts to prevent mosquito breeding by review of BMPs and remediating habitat

Impacts of No Approval

- Cut program by one-third; eliminate 7 permanent positions
- Further cuts in surveillance resulting in:
  - Human illnesses as the sentinel event rather than finding disease in vectors first
  - Potential spread of plague from higher elevations to urban areas
  - Likely increase in hantavirus cases due to lack of detection and education
  - Potential for undetected tickborne diseases
  - Emerging pathogens would be undetected and spread beyond control
- Elimination of monthly aerial applications and increased mosquito breeding with higher risk of acquiring West Nile virus
- Increased complaint response time and increased exposure to West Nile virus
- Education only rat complaint program with no field response
- With fixed funding program will continue to erode

Benchmarking of Vector Control Resources and Services

Resources and Services	Jurisdictions					
	San Diego		Orange	Minnesota	Harris	Marin/ Sonoma
Demographics						
Population (by millions)	2.9		2.9	2.7	3.0	.6
Area (by square miles)	4,200		798	2,900	1788	960
Resources	**Current**	**Proposed**				
Budget ($ by millions)	$3.4	$7.0[2]	$4.9	$12	$6.0	$3.4
Staffing: Permanent	22.5	28.75	39	47	67	25
Temporary	2.0	13	19	178	50	0
Budgeted Staff Years[1]	24.5	41.75	48.5	136	92	25
Staff per population (thousands)	118	69	60	20	33	24
Area per staff (square miles)	171	101	16	21	19	38
Budget per capita (ranking)	$1.17	$2.41 (3)	$1.69 (5)	$4.44 (2)	$2.00 (4)	$5.67 (1)
Services						
Surveillance						
• Gravid traps per week (April –October)	1	5	25	80	125	3
• CO2 traps (April –October)	30	70	50	80	120	25
• Sentinel chicken flocks (April – November)	3	4	1	4	None	7
• Dead bird collection & testing (April – October)	Yes	Yes	Yes	Yes	Yes	Yes
• Plague testing locations/ week (March – November)	.5	2	.6	None	None	None
• Hantavirus testing locations/week (year-round)	.5	1	2	None	None	None
• Tick testing locations/week (November – March)	1	2	.05	100	None	None
Mosquito Control						
• Sources inspected/treated monthly (April – October)	200	1,000	817	6,500	0	7,300
• Sources treated monthly aerial by applications of larvicides (April – October)	27	27	0	0[3]	0	0[3]
• Review of BMPs (year-round)	10	100	Yes	Yes	No	Yes
Outreach						
• Amount of outreach performed	Extensive	Extensive	Extensive	Extensive	Extensive	Extensive
Complaints						
• Rat complaints/year	3,000	3,000	15,000	No program	No program	Consult only
• Rat complaint response time (days)	4.3	3	Not tracking	No program	No program	Consult only
• Mosquito complaints/year	2247	2247	3,317	5,000	1,000	2,200
• Mosquito complaint response time (days)	7.6	3	Not tracking	5	Not tracking	Not tracking

[1] Temporary positions considered ½ FTE

[2] Total first year budget is $9.5. million For comparison purposes, $1 million for establishing the contingency reserve and $.8 million for consultant costs/ballot costs and $.5 million for vehicle and building costs were not included. Additionally, $1 million included for vector habitat remediation activities, which is unique to County of San Diego.

[3] Periodic aerial applications of larvicides usually following positive West Nile virus results at heavy mosquito breeding areas