Placer Mosquito and Vector Control District
Annual Report 2011

Mosquito and Vector Control Matters
OUR MISSION:

To effectively and efficiently manage the risks from vectors and vector-borne disease in order to protect public health and quality of life in Placer County.
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DEAR RESIDENTS, COLLEAGUES & FRIENDS

It is a pleasure to present to you the 2011 Annual Report for the Placer Mosquito and Vector Control District!

Since 2009, the District has steadily improved on its ability to provide a comprehensive Integrated Vector Management (IVM) program to help prevent the spread of vector-borne disease such as West Nile virus (WNV) and Lyme disease and the negative effects of mosquitoes and yellowjackets on all those who live, work and recreate in Placer County.

In 2011, our surveillance program conducted weekly adult mosquito trapping to determine where the most efficient and effective treatments could be made to combat the spread of WNV-infected mosquitoes. Laboratory staff regularly set traps in the field, counted and identified mosquitoes, and tested mosquitoes, ticks, and dead birds for WNV and Lyme Disease.

Our control technicians inspected and controlled immature mosquitoes in areas of standing water from water troughs and unmaintained swimming pools to stormwater catchbasin systems and agricultural fields. Technicians also responded to requests for service from the public and maintained our mosquitofish program.

Our public information officer and front office staff provided important information to the public that informed them on how to protect themselves and their loved ones from mosquito- and tick-borne disease, and helped to develop a grassroots effort to advocate for changes in new regulations to protect the District’s ability to continue to protect human health and the environment.

In 2011, the Board of Trustees and I worked to create the District’s first formal strategic plan, and defined the District’s mission to effectively and efficiently manage the risks from vectors and vector-borne disease in order to protect public health and quality of life in Placer County. We further reaffirmed our commitment to the responsible and sustainable use of public funds to support the District’s vision to maintain a science-based integrated vector management program that can respond to related public health issues or events.

I would like to thank our dedicated trustees, staff, consultants and partner agencies for their continued support in making the District as effective and efficient as it can be.

If you have any questions about this report please visit our website at www.placermosquito.org or call us at 1-888-758-2343.

Sincerely,

Joel Buettner,
District General Manager
HISTORY

Although the Placer Mosquito and Vector Control District is one of the newest Districts in the Sacramento region, Placer County has a rich history in mosquito control, having one of the first organized mosquito control campaigns in the state.

Gordon Patterson’s book, The Mosquito Crusades, details the beginning of the organized mosquito control effort in California. According to Patterson, it all began when local Penryn clergyman Fred Morgan wrote a letter to William Herms, an entomologist at the University of California.

In his December 1909 letter, Morgan requested Herms’ aid in fighting the “malaria mosquito”. Herms’ response to Morgan explained how the whole effort needed to begin with a comprehensive educational movement. After a series of Herms’ lectures and demonstrations that were presented in Loomis, Penryn, Auburn, Newcastle, and Roseville, a permanent “anti-malaria-mosquito organization” was established in a small office donated by the Penryn Fruit Company. It was February 12, 1910.

In 1915, the California Legislature adopted the “Mosquito Abatement Act” to help protect people from health risks associated with mosquitoes. This provided the basis for creating Mosquito Abatement Districts throughout the state.

The original Placer Mosquito and Vector Control District (District), then known as the “Placer County Mosquito Abatement District” was originally formed in 1996 to provide mosquito abatement services within the original District boundaries. The City of Lincoln passed a special tax measure to fund mosquito control services in 1998.

In July of 2000, the County conducted an assessment ballot proceeding. The authority granted by the ballot proceedings established a funding mechanism to provide services within West County beginning July 2001.

Later, in 2004, the District annexed the area of Sheridan from Sutter-Yuba Mosquito and Vector Control District and absorbed the portion of property tax allocations attributed to Sheridan to fund these services. That same year, the District authorized proceedings for a proposed special assessment for the East County area to be annexed into the District. The authority granted by the ballot proceedings established a funding mechanism to provide services within East County beginning July 2005.
OUR PROGRAM

The District uses an Integrated Vector Management approach to control vector populations.

**Integrated Vector Management (IVM)** is a decision support system for the selection and use of vector management strategies separately or in combination, and coordinated into an overall management approach. Decisions are based on an assessment of the risk to public health posed by vectors and vector-borne disease. Integrated vector management also takes into account the interest of and impacts on society and the environment.

This comprehensive program incorporates three basic strategies: surveillance, control, and public education.
SURVEILLANCE

Surveillance is an essential component of an Integrated Vector Management Program. The District conducts surveillance for vectors and some of the diseases they carry. A large proportion of our resources is devoted to conducting adult and immature mosquito surveillance and West Nile virus surveillance. We also conduct surveillance for other vectors such as ticks and yellowjackets. The newest part of our surveillance program is our ability to conduct disease surveillance through on-site testing of mosquito and tick samples.

VECTOR SURVEILLANCE

Mosquito Surveillance
Our program consists of locating mosquito development sources and monitoring mosquito populations and disease activity over time and space. We collect and analyze data on abundance of larval and adult mosquito species. We monitor distribution patterns of the different mosquito species, determine risk periods of public exposure to mosquito-borne diseases, and evaluate mosquito control activities.

Tick Surveillance
During peak tick season (December-May) our staff collects ticks at designated tick surveillance sites. We are able to test these ticks for Lyme disease. This information helps us identify high-risk areas for tick-borne disease based on abundance of ticks and/or presence of disease in the tick population.

Yellowjacket Surveillance
Our yellowjacket surveillance includes trapping of yellowjackets at monitoring sites to determine species and abundance. In 2010, three monitoring locations were established in the Tahoe area, and trapping at these locations continued in 2011. Species identification is important to determine if the species found are pestiferous and pose a threat to public health.
DISEASE SURVEILLANCE

West Nile virus (WNV) Testing
After the adult mosquitoes collected from traps are identified and counted, females are pooled together by species. Each pooled sample contains from one to 50 mosquitoes. Each sample is tested for WNV.

Aside from mosquitoes, we also test dead birds that we collect from reports to the California Dead Bird hotline for the presence of WNV. Typically, dead birds are the first indicator of increased WNV activity in the county.

We also use sentinel chickens to help us track virus activity. By strategically placing sentinel flocks of chickens at several locations within Placer county, we are able to monitor and track virus activity. Chickens are an ideal sentinel species because they are able to produce antibodies against WNV within a few days after being bitten by a mosquito infected with virus, but they do not become ill or die from the virus. Blood samples from the chickens are routinely taken by laboratory staff and sent for testing for the presence of these antibodies. If the presence of these antibodies is confirmed by the California Department of Public Health laboratory, there is an increased potential risk that the virus could be transmitted to wildlife, horses or humans.

Lyme Disease Testing
During peak tick season (December-May) our staff collects ticks at designated tick surveillance sites. We are able to pool and test these ticks for Borrelia burgdorferi, the agent that causes Lyme disease. This information helps us identify high-risk areas for tick-borne disease based on abundance of ticks and/or presence of disease in the tick population. Although there is little that can be done for tick control other than making habitats less suitable for ticks, we use our data to help raise public awareness of when and where ticks and Lyme disease are present.

Efficacy Testing
Efficacy testing involves using caged mosquitoes and droplet collectors to examine the success of aerial or ground-based mosquito adulticide treatments.

Mosquitoes are reared in the district laboratory to provide genetic strains known to be free of pesticide resistance, and to ensure mosquitoes are readily available when needed.

Data collected through efficacy testing allows treatment methods to be continuously refined and improved.
CONTROL ACTIVITIES

The Placer Mosquito and Vector Control District employs three different types of control methods to control for vectors.

Biological Control
Biological control is the use of natural enemies to manage mosquito populations. There are several types of biological control including the direct introduction of parasites, pathogens and predators to target mosquitoes.

The District makes use of mosquitofish (Gambusia affinis), a predatory fish that feeds on mosquito larvae. Most of the mosquitofish we use are produced at our facility. We are able to produce approximately 130 pounds of fish on an annual basis.

Physical Control
The physical control aspect of our Integrated Vector Management program works to eliminate mosquito development sites.

This method can be used to reduce larval mosquito sources as well as adult mosquito habitats. When this method is effective, it greatly reduces or eliminates the need to use other methods of control.

Our program works with landowners and land managers to limit standing water, manage emergent vegetation, and maintain ditches and natural drains. We also work with our agricultural partners to coordinate irrigation and mosquito treatments.

Microbial & Chemical Control
Microbial and chemical control is the use of specific microbial and chemical compounds (insect growth regulators and insecticides) that eliminate immature and adult mosquitoes. They are applied when biological and physical control methods are unable to maintain mosquito numbers below a level that is considered tolerable or when emergency control measures are needed to rapidly disrupt or end the transmission of disease to humans.

Larvicides target mosquito larvae and pupae in the water. Adulticides reduce adult mosquito populations. All products applied by the District are registered with the California Environmental Protection Agency, and are listed as public health pesticides.

MICROBIAL CONTROL

Bti (Bacillus thuringiensis israelensis) and Bsph (Bacillus sphericus) can be as effective as chemical insecticides. Bti and Bsph are a type of bacteria that, when eaten by mosquito larvae, produces a protein crystal that destroys the larvae’s intestinal lining.

It has no effect on other aquatic organisms except midges in the same habitat, and is very effective at controlling mosquito larvae.
PUBLIC EDUCATION

Our public information and outreach program educates and informs the public about mosquito and vector control and prevention methods by:

- Working with educators, community representatives, elected officials, and the media to provide the most current and accurate information about public health threats posed by mosquitoes and other vectors in our county
- Engaging the public through community events and activities
- Providing educational presentations to groups of all ages

In 2011, the District made contact with over 2,000 residents at large community events and made additional contacts through classroom and community group presentations. We sponsored booths at the Placer County Fair and Gold Country Fair, as well as participated in several science and health fairs throughout the county.

We made presentations to local groups, including several service organizations, city departments, and local governing boards. The District is also very involved with public information and outreach at the state-wide level, working in conjunction with the California Department of Public Health on various outreach efforts and development of educational materials, as well as with the Mosquito and Vector Control Association of California.
2011 BY THE NUMBERS

957
Service Requests

9,034
Mosquito Sources Inspected

2,325
Outreach Event Contacts

227
Dead Birds Reported

50,125
Fish Stocked in Mosquito Sources

1,938
Mosquito Samples Tested

184
Tick Samples Tested

6
Different Yellowjacket Species Collected
KEY ACHIEVEMENTS OF 2011

Two thousand eleven was a year unlike any other in the Placer Mosquito and Vector Control District’s history—distinguished, of course, by the most restrictive permit mosquito and vector control agencies in California have seen in a long time, which resulted in a significant reallocation of resources to planning and compliance, both at the statewide and district levels.

Both because of and in spite of this challenge, the Placer Mosquito and Vector Control District improved yet again in many of the most important areas. But it wasn’t easy. Staff worked harder than ever. Trustees took on more responsibilities than ever. Our residents and partner agencies, too, have been involved more than ever. And the results testify to all this effort.
IN 2011, THE PLACER MOSQUITO AND VECTOR CONTROL DISTRICT:

1. Established our mosquitofish-rearing program. In the past, our mosquitofish supply came from wild-caught fish throughout the county and purchases made from the neighboring Sacramento-Yolo district.

2. Expanded tick surveillance program to include the testing of ticks collected during surveillance activities, as well as collaborating with the California Department of Public Health and the Placer County Department of Health and Human Services to share tick-borne disease data.

3. Developed its first-ever strategic plan, through an in-depth planning process with the goal of improving governance, measuring cost-effectiveness, while maintaining financial security, maximum productivity, and open communications.

4. Negotiated updated Memoranda of Understanding that incorporate current fiscal realities and while still remaining a competitive employer and desirable place to work.

5. Developed new relationships and strengthened existing partnerships with local municipalities, Placer County and the State of California by assisting, collaborating and consulting in mosquito prevention best management practices projects.
2011 VECTOR SURVEILLANCE DATA

In 2011, the Placer Mosquito and Vector Control District collected 55,767 adult mosquitoes in traps and resting boxes, of which 47,972 (93.4%) were female, and 3,404 (6.6%) were male.

SUMMARY OF MOSQUITO ABUNDANCE

- *Culex pipiens* abundance was on average lower than in previous years, and peaked much later than usual due to an extended, cool spring.

- *Culex tarsalis* abundance was on average about half of the five year average; however, the seasonal pattern was similar to previous years.

- *Anopheles freeborni* abundance was on average about 80% less than in previous years. Seasonal timing followed the five year average.

- *Aedes sierrensis* peak abundance was almost 10 times higher than the five year average, and occurred slightly later in the season.
Types of mosquito traps used:

- **Fay-Prince** – uses carbon dioxide, contrasting black and white color, and wind baffles to attract mosquitoes, which are sucked in by a small fan, and may collect a greater variety of species than some other traps.

- **EVS** (encephalitis vector surveillance trap) – is very good at collecting *Culex tarsalis*, is widely used, attracts with carbon dioxide and sucks mosquitoes into collecting net with a small fan.

- **Red box or resting box** – we use this type of device to target *Anopheles freeborni*, which are not as strongly attracted to carbon dioxide traps.

Numbers of mosquito traps used:

- **Fay-Prince** – 43 weekly sites, 853 trap-nights (collections)
- **EVS** – 7 weekly sites, 183 trap-nights
- **Resting Box** – 7 weekly sites, 51 collections
- **Service requests**: 169 trap-nights

**OTHER VECTORS**

**Ticks**

Our current tick program includes tick flagging (collection) at least three times per year from seven core sites, and at least once per year from 15 additional sites. Species collected include *Ixodes pacificus, Dermacentor occidentalis* and *Dermacentor variabilis*. *Ixodes pacificus* are tested for *Borrelia burgdorferi*, the agent for Lyme disease. In 2011, there were: 25 total collections, 856 *I. pacificus* ticks; 184 total pools tested, 100 samples (pools) tested in-house; 11 positive pools from four sites.

**Yellowjackets**

Yellowjackets were trapped in the three Tahoe-area monitoring locations established in 2010. The abundance of yellowjackets in 2011 was moderate. Species abundance was markedly different between 2010 and 2011, with *Dolichovespula arenaria* the predominant pest in 2010 and *Vespula pensylvanica* the most abundant species in 2011. Total of 33 trapping events, with 375 individual yellowjackets collected.
2011 DISEASE SURVEILLANCE DATA

WEST NILE VIRUS

Mosquito samples:
In 2011, a total of 1,938 mosquito samples were tested, with 1,560 tested in-house. The first positive result occurred on July 21, 2011 and the last positive result on Sept 27, 2011.

A total of 48 positive samples came from 19 locations, mostly occurring on the western portion of the district.

Sentinel chickens:
In 2011, the District maintained a total of 48 sentinel chickens in eight flocks placed in Sheridan, Loomis, Meadow Vista, Lincoln, Tahoe, Roseville, Auburn, and Granite Bay.

Chickens were tested for WNV antibodies from 5/13/2011 to 10/28/2011, with the first seroconversion occurring on 9/15/2011. At the end of the season, a total of six chickens from two flocks (Sheridan 5, Lincoln 1) tested positive for WNV antibodies.

Dead birds:
At the beginning of the 2011 season, dead birds were retrieved for testing by CVEC. Starting in July, the district began in-house testing of dead birds by oral swab and brain tissue prior to sending to the Center for Vectorborne Diseases (CVEC).

In-house testing capabilities allowed for detection of acute positive infections in less than 24 hours. However, district procedures do not detect chronic infection.

- Total dead birds reported in 2011: 227
- Total tested in 2011: 45 (25 tested in-house)
- First acute positive 9/27/2011, last acute positive 10/3/2011
- Total positive dead birds: 10 acute, 8 chronic
- Birds testing positive for acute infection included Western scrub jay (5, 50%), American robin (2, 20%), and one each (10%) of American crow, house finch, and house sparrow.
CONTROL ACTIVITIES IN 2011

PHYSICAL CONTROL
Flooding due to beaver dams has been on the increase in Placer County. Beaver dams cause significant mosquito breeding habitat to form by flooding pastures and other fallow land.

The District was involved with 36 beaver-related projects in 2011. This number is expected to increase over the coming years.

BIOLOGICAL CONTROL
In 2011, the distribution of mosquitofish to permanent, contained water sources was made much easier with an adequate supply of healthy fish from the District.

- The technicians stocked approximately 50,125 fish or 111 pounds in 2011 in permanent, contained water sources.
- The amount of fry produced at the District this season was approximately 28,300 or 63.0 lbs.
- The amount of fish being overwintered this year for next season is approximately 40,000 or 88.0 lbs.

MICROBIAL AND CHEMICAL CONTROL
This season Placer County had approximately 12,700 acres of conventional rice and 2,200 acres of organic rice.

- The conventional rice was treated with larvicides 6 times this season and the organic rice twice, for a total of 80,600 acres of rice larvicided by aircraft.
- Of the approximately 8000 acres of irrigated pasture that is routinely inspected, 230 acres were treated with larvicides this year.

19,982 acres were treated for adult mosquitoes by truck foggers and hand foggers this year.

- The majority of the truck fogging operations took place in West Roseville and Lincoln in response to WNV positive mosquito pools, sentinel chickens, and birds in these areas, along with mosquito abundance.
- 44,000 acres were treated for adult mosquitoes by aircraft over the agricultural areas of the District.

SERVICE REQUESTS COMPLETED IN 2011

Mosquito Sources
In 2011 the District had approximately 17,218 documented mosquito production sites in our database. Our technicians made 21,736 inspections of these sites, with many sites inspected multiple times.

Of the 21,736 mosquito sources inspected 3,237 sites were treated with larvicides to prevent adult mosquito emergence.
### Financial Statements

**Placer Mosquito and Vector Control District**  
**Statement of Net Assets**  
**June 30, 2011**

<table>
<thead>
<tr>
<th>Assets</th>
<th>Governmental Activities</th>
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</thead>
<tbody>
<tr>
<td>Cash and investments</td>
<td>$ 2,041,132</td>
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<tr>
<td>Restricted cash and investments</td>
<td>$ 399,263</td>
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<tr>
<td>Interest receivable</td>
<td>$ 2,501</td>
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<td>Prepaid items</td>
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<td>Deferred costs, net</td>
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<td>Capital assets</td>
<td>$ 438,627</td>
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<td>Nondepreciable</td>
<td>$ 5,618,202</td>
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<td><strong>Total assets</strong></td>
<td><strong>$ 8,613,931</strong></td>
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<table>
<thead>
<tr>
<th>Liabilities</th>
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<tbody>
<tr>
<td>Accounts payable</td>
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<tr>
<td>Accrued interest payable</td>
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<td>Long-term liabilities:</td>
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<tr>
<td>Due within one year</td>
<td>$ 185,211</td>
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<tr>
<td>Due in more than one year</td>
<td>$ 4,440,440</td>
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<td><strong>Total liabilities</strong></td>
<td><strong>$ 4,885,348</strong></td>
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<table>
<thead>
<tr>
<th>Net Assets</th>
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<tr>
<td>Invested in capital assets, net of related debt</td>
<td>$ 1,882,552</td>
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<tr>
<td>Unrestricted</td>
<td>$ 1,846,031</td>
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<tr>
<td><strong>Total net assets</strong></td>
<td><strong>$ 3,728,583</strong></td>
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## Placer Mosquito and Vector Control District
### Statement of Revenues, Expenditures, and Fund balance changes
### Fiscal Year ending in June 30, 2011

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Charges for services (benefit assessments)</td>
<td>$3,285,340</td>
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<td>Property taxes</td>
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<td>Investment earnings</td>
<td>$39,255</td>
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<td>Miscellaneous</td>
<td>$7,327</td>
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<td><strong>Total revenues</strong></td>
<td><strong>$3,366,363</strong></td>
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<table>
<thead>
<tr>
<th>Expenditures</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Health and sanitation:</td>
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<tr>
<td>Salaries and benefits</td>
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<tr>
<td>Agriculture</td>
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<td>Professional services</td>
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<td>Office</td>
<td>$203,387</td>
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<td>Maintenance</td>
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<td>Collection charges</td>
<td>$69,401</td>
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<td>Insurance</td>
<td>$68,319</td>
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<td>Utilities</td>
<td>$53,949</td>
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<td>Fuel and lubricants</td>
<td>$48,439</td>
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<td>Legal services</td>
<td>$42,610</td>
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<td>Rents and leases</td>
<td>$18,480</td>
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<td>Membership dues and subscriptions</td>
<td>$10,953</td>
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<td>Travel and transportation</td>
<td>$10,866</td>
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<td>Debt service:</td>
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<td>Interest</td>
<td>$222,077</td>
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<td>Principal</td>
<td>$170,000</td>
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<tr>
<td>Capital Outlay</td>
<td>$182,194</td>
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<tr>
<td><strong>Total expenditures</strong></td>
<td><strong>$3,947,493</strong></td>
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</table>

| Net change in fund balance            | $<581,130>|
| Fund balance, July 1, 2010            | $2,866,023|
| **Fund balance, June 30, 2011**       | **$2,284,893**|
FIGHT THE BITE
by practicing the District’s 3Ds of protection:

1. **DRAIN** any standing water that may produce mosquitoes.

2. **DEFEND** yourself against mosquitoes by using an effective insect repellent, such as DEET, Picaridin or Oil of Lemon Eucalyptus. Make sure you follow label directions!

3. Contact the **DISTRICT** for help. Call us at (888) 768-2343, or visit us online at www.placermosquito.org. We are here to serve you.

   *Your tax dollars hard at work*