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PMP PestManagement PROFESSIONAL

GAZING INTO THE MOSQUITO CRYSTAL BALL



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THE MANY PATHS TO MOSQUITO SERVICE SUCCESS

BY **KARL KIBODEAUX SR., ACE**

For many pest management professionals (PMPs), mosquito management presents a variety of opportunities to increase revenue and drive profits to their bottom lines. In years past, vector control was considered more of an add-on service, but today, many PMPs have created a steady source of revenue with recurring mosquito services. Let's look at some service applications a PMP can perform — and how they fit into your service portfolio.

• **WIDE-AREA MOSQUITO CONTROL** — Most mosquito control districts, governments and non-profit organizations perform these applications on a regular basis using truck-mounted, ultra-low volume (ULV) equipment, as well as aircraft for large mass areas. There are plenty of opportunities for PMPs to engage in these applications. Some small towns and communities don't have the resources to train or license their employees to perform these applications. Gated communities, homeowner associations (HOAs), campgrounds, RV parks, resorts, zoos, golf courses, outdoor weddings and parties, theme parks, baseball fields, soccer fields, church events and industrial sites — including petroleum chemical facilities — also fit into this application opportunity category. As your mosquito management partner, CSI offers several products for these applications, including CSI 4-4, CSI 30-30, Mosquito Mist Ultra, Stryker 6-60 and Stryker 5-25.

• **MOSQUITO MISTING SYSTEMS** — Installing and servicing these systems provide an opportunity for recurring revenue. The idea behind this concept is to install equipment that uses a series of nozzles to deliver a small amount of product around the structure to control mosquitoes and other insects. Generally, these systems are set on an automatic timer to go off several times during the day and night. CSI offers several products labeled for misting systems, including Vector Ban, Vector Ban Plus, Mosquito Mist Ultra, Stryker 6-60 and Stryker 5-25.

• **LARVICIDING** — Applying product labeled for application to standing water — where mosquito larvae live — is known as larviciding. This application

often is overlooked by PMPs. Yet it can provide long-term control in areas of heavy infestation, and will work very well in conjunction with any adulticiding applications.

• **BARRIER TREATMENTS** —

These applications have become one of the fastest-growing segments in the pest management industry, especially among mosquito control franchises. Most PMPs use backpack mister-blowers to apply an adulticide and/or insect growth regulator (IGR) around the target area of control. CSI's Bifen IT is particularly effective for this type of application. In addition, PMPs looking for an extended residual time will find that CSI's Cyzmic CS with CapVantage Technology delivers sustained results, especially in sweltering summer months and other adverse conditions.

In 2014, CSI launched Tekko Pro, a proprietary combination chemistry IGR containing two active ingredients: pyriproxyfen and novaluron. These two actives have different modes of action, which makes Tekko Pro an ideal fit within an integrated pest management (IPM) approach.

Plus, when you combine the three active ingredients found in Cyzmic CS and Tekko Pro, you get the added security of CSI's 60-day Mosquito Protection Program: CSI guarantees 60 days of no callbacks after applying Cyzmic CS in combination with Tekko Pro (in accordance with program guidelines) for residential control of mosquitoes. For more details, please visit ControlSolutionsInc.com/programs or contact your local account manager.

Incorporating mosquito control to your service offerings will help you grow your business, and CSI is here to support you. With our first-class technical expertise and our broad, affordable and effective product portfolio, we can help — no matter what application type you choose.



KIBODEAUX is the south central region territory manager for Control Solutions Inc. (CSI). Contact him at kkibodeaux@controlsolutionsinc.com.

GAZING INTO THE MOSQUITO CRYSTAL BALL

Public health concerns over mosquitoes lead experts to predictive modeling.

BY **GENE WHITE, BCE** | Contributor

Who would have guessed that in 1999, when West Nile Virus (WNV) started its sweep across the United States, a major paradigm shift would begin in the role pest management companies play in protecting people's health? It didn't take long for pest management professionals (PMPs) to begin conversations and lay the groundwork for a line of business ignored by most of the industry before this time. We're talking about management plans for one of the most difficult and hideous pests of mankind, the mosquito.

Mosquitoes are still the No. 1 killer of humans, whether it's by transmission of a parasite (malaria), or by vectoring the three principal virus families — Bunyaviridae, Flaviviridae and Togaviridae — that cause the majority of encephalitic illnesses in humans. Many arboviral (arthropod-

borne virus) encephalitides have a global distribution, and until recently there were five main virus agents of encephalitis in the U.S.: St. Louis encephalitis (SLE), Eastern equine encephalitis (EEE), Western equine encephalitis (WEE), and La Crosse (LAC) encephalitis.

Things change, of course. Now, the emergence and local transmission of four relatively new viruses to the Americas have captured the attention of pathologists, medical entomologists, the news media — and therefore the public, as well as PMPs. These four mosquito borne illnesses include: WNV (1999), dengue fever (1980), chikungunya (2014 in Florida, 2015 in Texas), and Zika virus (2016 in Texas and Florida).

With local transmission of chikungunya and Zika virus in their infancy within the continental borders of the U.S., it is likely human infections will increase moving into the 2017 mosquito season. When and where these outbreaks occur will be

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dictated by vector biology, local and regional weather patterns, and the highly variable human factor.

ELEMENTS OF MOSQUITO MANAGEMENT

Although mosquito management differs from purely structural integrated pest management (IPM) strategies, many of IPM's underlying principles also apply to mosquito management. Two documents come to mind:

① Dr. Ted Gronovsky's IPM puzzle that "pieces in" the essential elements for a successful pest management program (see **Fig. 1** on p. MM6). His idea of structural IPM blends business and technical elements in various amounts of focus to create a holistic pest management program.

② A document that started off as a "job process" chart, the original concept created by *PMP* columnist Mark "Shep" Sheperdigian and myself many years ago, has since evolved into an IPM Process Guide with generalized terms to fit nearly any structural pest category that also can be applied to mosquitoes (see **Fig. 2** on p. MM6).

If your company is already providing, or plans to provide mosquito management services, be aware there are many (sometimes moving) pieces to the puzzle. Some mosquito management pieces are predictable, whereas others are highly variable. But to understand the complexity of how they all fit together, education is essential to ensure the pest management industry — and your company — are viewed as professional.

UNDERSTANDING THE MARKET

Choosing a mosquito market to enter is largely based on the capabilities and limitations of your company. Industry demographics show the majority

of PMPs target the residential and small business markets. Suppressive applications for these types of clientele easily fall within the capability of small- to medium-size companies.

No matter what market you choose, education should be the foundation of your mosquito management program. The company that presents the highest quality professional educational materials and takes the time to communicate with clients likely will win the lion's share of the local mosquito management market.

For larger mosquito management programs — municipalities, townships, mosquito abatement districts, or other clients with large tracts of land — the complexity of need increases. Not only do labor

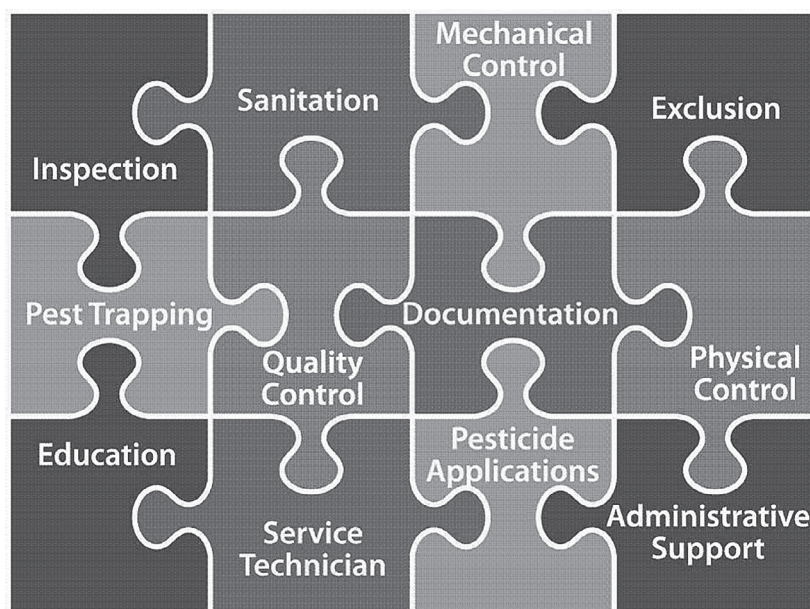


Fig 1. Integrated pest management is the sum of many parts, as illustrated by this puzzle. SOURCE: DR. TED GRANOVSKY

Integrated Pest Management Audit Map

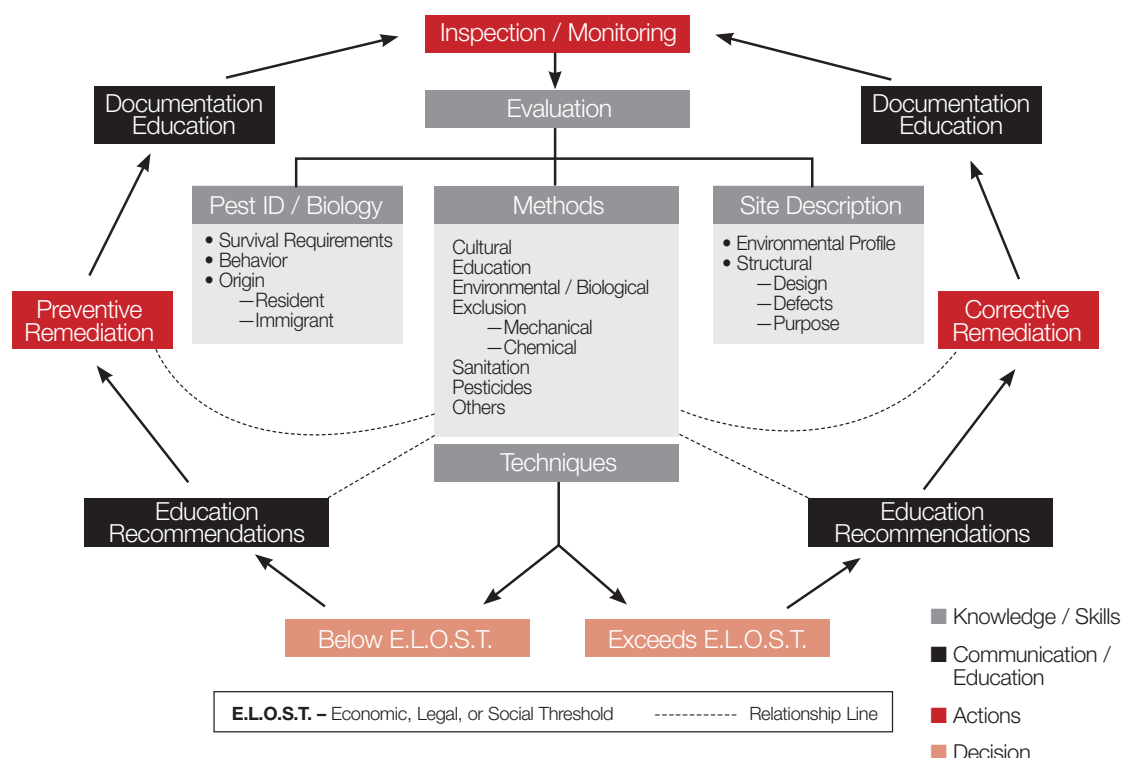


Fig 2. Regardless of the pest, an IPM audit must incorporate several strategies. SOURCE: MARK SHEPERDIGIAN AND GENE WHITE

needs increase, but technical understanding increases exponentially as these types of accounts may ask for active and/or passive surveillance (sentinel hosts, trapping), species identification, viral testing, larviciding, adulticiding, and even education to the public. In addition, PMPs may encounter regulatory considerations as water applications may require a National Pollutant Discharge Elimination System (NPDES) permit.

Dr. Mustapha Debboun, BCE, and a military veteran, is the director of the Harris County (Houston) Health Department's Mosquito & Vector Control division. The department oversees a state-of-the-art mosquito management program complete with surveillance teams, mosquito biologists, environmentalists, geneticists, education specialists, and all the equipment necessary to manage mosquitoes in a densely populated city like Houston.

When asked whether it is easy to predict mosquito outbreaks and disease transmission, Dr. Debboun's answer was a very abrupt *no*.

"But with help like technologies from Microsoft's 'Project Premonition,' we're getting better," he added, smiling. (*Editor's Note: Learn more about Project Premonition at [Microsoft.com/en-us/research/project/project-premonition](https://www.microsoft.com/en-us/research/project/project-premonition).*)

As in any good pest management program, Dr. Debboun's health teams look for conducive conditions in convergence with increased vector numbers. They can then take action and be slightly ahead of the disease transmission cycle. Predictive? Yes, but it's understood how quickly changing environmental factors such as rain, temperature and people can place them on the fence's edge between proactive and reactive treatments. It's only with diligence, hard work, and quick thinking they maintain their proactive edge.

Last, it would seem with all our science we'd be able to model these outbreaks for a better head start. One might look at the species range of *Aedes aegypti* and *A. albopictus* across North America as a good start, but it doesn't take all the factors into consideration. That's where the U.S. Centers for Disease Control and Prevention's (CDC's) Nowcast infectious disease model program for chikungunya virus comes in.

MOSQUITO INFECTIOUS DISEASE MODELING

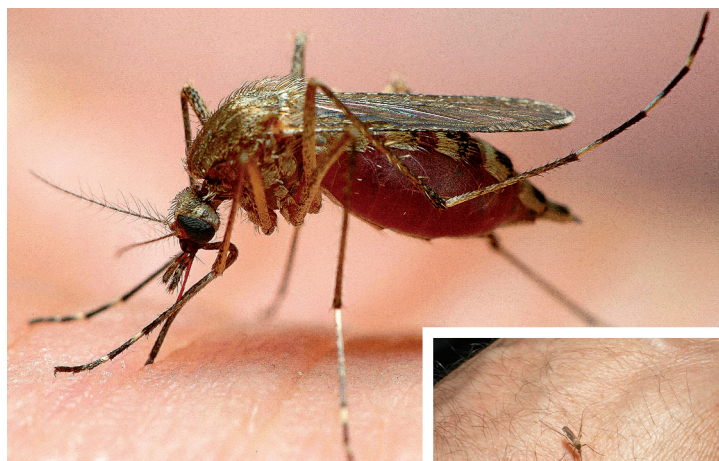
For many years, scientists have attempted to predict surges in mosquito populations with some success. At the very least, it has added to our understanding of the biology of the various species that cause human suffering. Recently, the CDC has used infectious disease modeling "to help public health experts identify and understand factors that influence when and where outbreaks occur, and to what extent they may spread." By understanding the nature of the disease and its vector(s), our control efforts are maximized and therefore, theoretically and with all things being equal, disease transmission is reduced.

The CDC developed Nowcast to help scientists estimate the local transmission of chikungunya virus. This computer model takes into account many factors — such as the biology and range of invasive vectors, and travelers going to and coming from infected areas of the world — all to reference the most likely geographical areas at risk for new local transmissions of the disease.

Keep in mind, though, that this model is designed to measure "a continuously moving front of the epidemic, rather than to predict spread of the virus into the future," according to the CDC. "Predictions into the future would require a different type of model."

It's also important to remember the CDC says "Nowcast model predictions are based on probability, not certainty of an event." If you're interested in more detail of the model's capabilities and

CONTINUED ON PAGE MM10



Ochlerotatus (formerly Aedes) canadensis also is known as the woodland pool mosquito. The encephalitis-carrying species is a daytime feeder, as seen on the author's hand.



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CONTINUED FROM PAGE MM7

what it does and does not measure, visit CDC.gov/chikungunya/modeling/index.html.

What about the accuracy of the model's predictions? In one study of the Americas (Caribbean): "The model predicted the likely introduction of chikungunya virus transmission to most locations either before or at the time when the first cases were reported," according to the CDC. "Out of the 10 locations with the highest probability of having cases after St. Martin, nine had reported cases by the end of April."

For a highly unpredictable area of scientific study, 90 percent is a pretty good number. It will be interesting to see this model work again on the U.S. mainland, as it may have great potential with similar

programs for other arboviral diseases such as dengue and Zika. Not only can healthcare organizations use these data for treatment planning and outreach, so can the pest management industry in partnering with their lead in the science.

Other focus areas of mosquito management innovations seem to be occurring in adult surveillance equipment such as Microsoft's "Project Premonition," lethal oviposition traps, and self-limiting genetic modification of mosquitoes. Soon, research data will unfold on how, when, and where PMPs can use them in their business models.

Stay tuned, and happy hunting. PMP

WHITE is technical director, Rentokil Steritech. You can reach him at gwhite@rentokil.com.

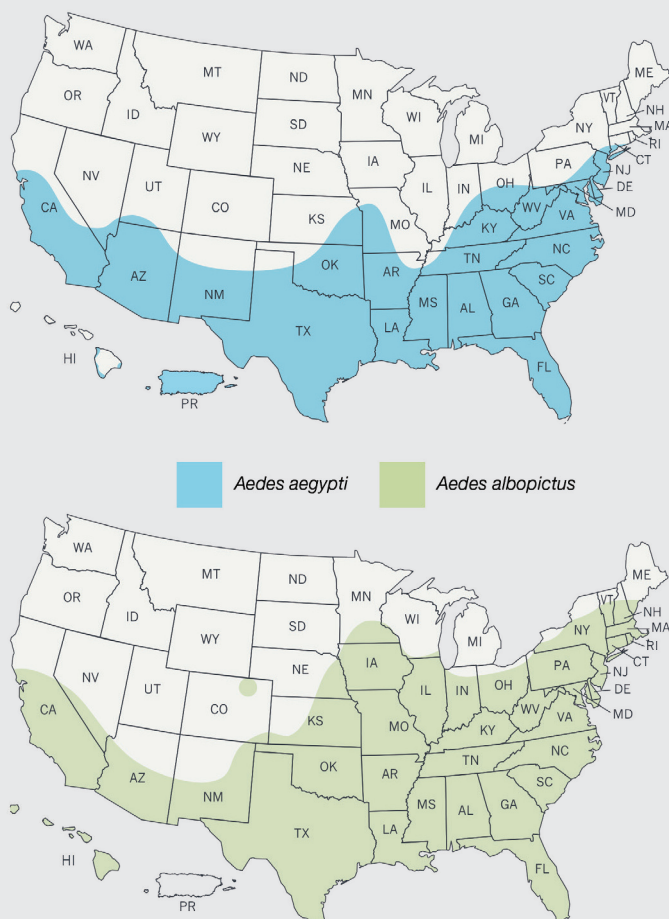
Predicting mosquito abundance: Is it possible?

Mosquito prediction would seem to be fairly easy. But as any entomologist and mosquito management practitioner understands, the complexity of environmental conditions can push even the best pest management professionals (PMPs) into being a "soothsayer" — the last label any of us wants to be tagged with. However, our science is progressing at a very fast rate to uncover not only the biology, but the abiotic influences that drive mosquito abundance. Meteorological data such as precipitation, temperature, soils, vegetation, topography and hydrological cycles (to name a few) all play a major role in the rise and fall of the mosquito biological cycles.

One factor our science has a good grip on is species range. Monitoring of species and abundance has become a critical part of mosquito management, and one need only look at species range charts to see native, expanding, receding or invasive ranges of studied organisms. The U.S. Centers for Disease Control and Prevention (CDC) has these charts for those mosquitoes relative to vectoring human disease as well as research papers that help them predict mosquito abundance.

One such paper describes "Using a Dynamic Hydrology Model to Predict Mosquito Abundances in Flood and Swamp Water" (visit TinyURL.com/m6mnap3). It's a comprehensive look at predicting mosquito abundance in flood plain and swamp conditions. While it does not account for the human factor for the container-breeding mosquitoes we encounter, it is a head start for the design of future models that may help us manage those species, too.

Obviously, pulling together all the abiotic, biological and disease prevalence data is necessary to make good decisions for predicting management needs. For now, we must rely on the methodology we currently have, but a new future, based on solid science, is just around the corner. — GW



The past sometimes is a good indication of what the future will bring. These maps show where the *Aedes aegypti* and *A. albopictus* mosquitoes are or have been found in the U.S., and estimate their range in 2016. SOURCE: U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION



THE FUTURE LOOKS BRIGHT

As mosquito opportunities grow, so do lessons learned, as *PMP*'s 2017 Mosquito Survey shows.

BY **HEATHER GOOCH** | Editor

Not so long ago, mosquito management was an occasional service for most pest management professionals (PMPs). An existing client might ask for an adulticide treatment for an upcoming backyard party, for example, or request mosquito dunks for their pond so they could enjoy the outdoors bite-free for the summer. For the most part, communities were in charge of sending fogging trucks through their neighborhoods, occasionally engaging a private firm for the task.

But in the past decade or so, because of the heightened media coverage of first West Nile virus (WNV) and then Zika virus — and their frightening prospects of birth defects or even death from a mere bite from a carrier mosquito — the game plan has changed dramatically. When warmer weather hits, PMPs find the phone ringing for mosquito control almost as much as they do for ants and other warmer-season pests.

STANDING OUT FROM THE CROWD

Pest Management Professional (PMP) recently conducted an exclusive reader survey about PMPs and the mosquito service segment. Because of the comparatively rapid growth of this segment industry-wide, our readers report

that the top obstacle facing them is the fierce pricing competition in the market.

David Bisailon, president of Envirocare Pest Control, Watertown, Conn., notes that his company was one of the first five in the state offering mosquito and tick service to residential customers when his 20-year-old firm got into the segment about five years ago.

"I have four dedicated mosquito technicians who take a layoff in the off-season," he explains, noting that nearly 75 percent of mosquito service comes from existing general pest control (GPC) or termite management customers. "They come back in March for sales, and applications start in mid-April."

But Jeff Annis, chairman of Advanced Services, Augusta, Ga., notes there is no "off-season" for mosquitoes in his market, where temperatures are above 55°F nearly year-round.

"Even if it is just a visit where you work with an integrated pest management (IPM) checklist, there is something you can do about mosquito control all months of the year," he points out, adding that firms that don't take IPM seriously would be wise to remember the acronym does not equal "indiscriminate pest massacre."

Advanced Services Technical Director Bo Thomas, ACE, says his technicians are cross-trained to look for conducive conditions during every service.

PRO TIPS

PAMELA BLAUVELT:

The timing is right for mosquito services right now, because the public sees mosquitoes not only as a disease threat, but a threat to also enjoying their backyards.



MICHAEL TULP:

If you're going to get into mosquito work, do your homework and take it seriously. You can't just slap a mosquito sign on the side of the truck. You've got to train, and you've got to train, and you've got to train.



DAVID BISAILLON:

Mosquito technicians need to be physically fit and pay attention to detail. He or she is going to be wearing a 40-lb. backpack and doing eight to 10 stops in 90°F heat. We supply water, and send reminder text messages: "Are you drinking water?" We emphasize that drinking soda does not count.



MORE ONLINE

Online at PMPPestTalk.net, join the discussion of how tick control pairs nicely with mosquito work.

"If they're getting bitten during an outside treatment, for example, they know there's a mosquito problem," Thomas says. "They explain to the customer what our company can do to help fight WNV."

To combat the pushback of "We don't have mosquitoes" from customers, Thomas says, the company rebranded its service as Pest Plus.

"We're not just doing the perimeter of the home, but also the perimeter of the yard and the foliage," he explains, noting that it has extra benefits. "We have had bad Argentine ant issues, and this approach keeps them, fleas and a lot of other pests from foraging further out. It takes a little more product, but that product, put in the right place, reduces callbacks and upset customers."

Mike Tullos, vice president of Cramer Pest Control, Fort Mill, S.C., reports his firm has a similar program, branded as Premier Plus.

"We have been offering mosquito service for the past five years, and find it is a reliable source of revenue if the treatments are done correctly," Tullos adds. "We service for mosquitoes monthly, even with the Premier Plus program being a quarterly service."

Instead of using universal techs, Adam's Pest Control has put two technicians specifically on monthly mosquito service. Michael Tulp, vice president of the Jupiter, Fla.-based company, says he'd rather invest in intensive training. "It's like anything else: If everyone does five or 10 mosquito jobs, no one's an expert," he says. "But if one guy does 50, he's an expert."

Ravi Sachdeva, CEO and resident entomologist of American Pest Management, Manhattan, Kan., says his team has expanded its mosquito service beyond special events to season-round protection. While that's brought in additional, recurring revenue, he's quick to point out that American hasn't left special events behind.

"We market our mosquito service at bridal shows, especially those with popular outdoor wedding venues," he says. "We exhibit at several local shows, and follow up with the venues involved with an e-mail detailing our program. Their expectations

are higher, and they are treated like a white-glove account. We are likely to increase the frequency of treatments if the product label will allow it."

Griffin Pest Solutions has found success with mosquito work as an upsell service to existing customers *and* a standalone service to new customers. Pamela Blauvelt, vice president of operations for the Kalamazoo, Mich.-based firm, notes cross-trained technicians perform the monthly work.

"We use the universal technician model for just about everything we do," adds Blauvelt, who also is vice president of the Michigan Pest Management Association. "Because of our geography and distance between customers, it makes sense for us to do it that way. In dense urban areas, however, it doesn't have the same importance because customers are closer together. Some firms may opt to dedicate mosquito specialists because of the expense of mosquito management equipment and the extra training."

Brian Garrison, COO of national franchisor Mosquito Joe, based in Virginia Beach, Va., says residential service is his company's bread and butter, but his team encourages franchisees to think outside the box — and inside their communities.

"There is so much opportunity, from public pools with picnic areas to golf courses, zoos, and restaurant patios," he says.

EDUCATING CONSUMERS

The second-biggest obstacle for mosquito service, as ranked by *PMP* readers, is competing against do-it-yourselfers (DIYers). The third-biggest obstacle is customer education — and by extension, cooperation.

Charles Osborne, ACE, president of Osborne Pest Management, Colorado Springs,

Colo., says even with extensive habitat modification, it's nearly impossible to provide complete mosquito control.

"We're talking about a creature that flies and the wind blows them in," he

CONTINUED ON PAGE MM14

PRO TIPS

JEFF ANNIS:

We train a lot about droplet size and how to control drift. We ban using the machine if the wind is noticeable at all. We also don't spray anything on flowering plants that are obviously used by pollinators. We note this on the work order when we adjust our treatment methods, so the customer knows we are looking to control drift or protect pollinators.



BO THOMAS:

We have an in-house creative team that does our commercials, and you can see their work on YouTube at "TeamBugStoppers." One that got a lot of attention showed kids turning into zombies upon being bitten by mosquitoes. We scheduled the ad to play during episodes of "The Walking Dead," since we figured they'd be the least offended by the concept. It's been a big hit — and brought in business.



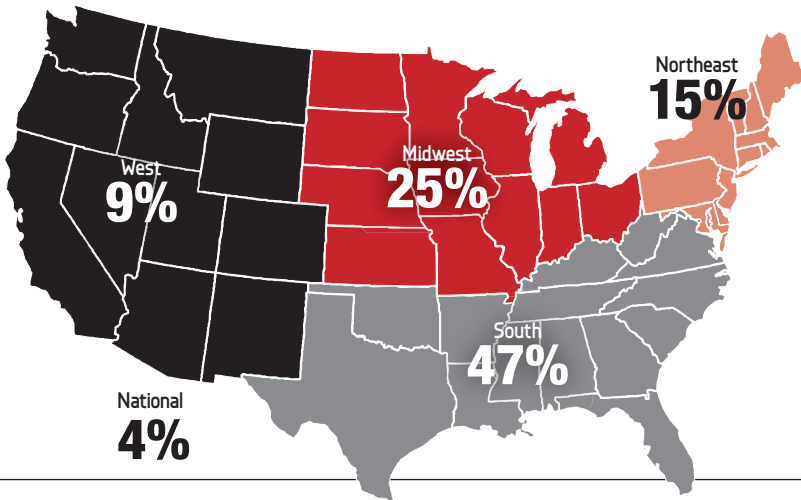
CHARLES OBSORNE:

Customers have to realize that no matter what you do, they can and will encounter mosquitoes. These are flying insects. We can reduce mosquito populations, but we're not pied pipers. The average consumer is more educated and understands this, thank goodness, but communication is the biggest thing.



MORE ONLINE

Online at PMPestTalk.net, Charles Osborne, ACE, discusses his time in the U.S. Army, treating mosquitoes for Camp Victory in Iraq.



SOURCE: PMP ONLINE SURVEY CONCLUDED FEB. 2017
WITH 110 RESPONDENTS

Area of Operations

MIDWEST (OH, IN, IL, MI, WI, MN, MO, IA, ND, SD, NE, KS)

WEST (AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY)

SOUTH (AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV)

NORTHEAST (CT, DE, ME, MD, MA, NJ, NH, NY, PA, RI, VT, D.C.)

2017 Projected Total Revenue

48%

\$499,999 or less

13%

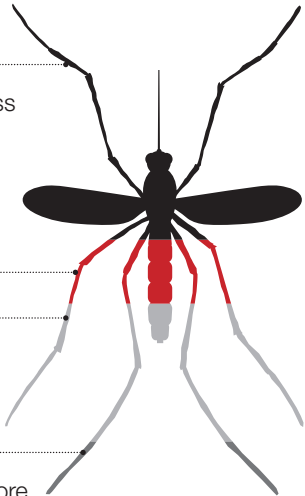
\$500,000 to \$999,999

28%

\$1 million to \$4,999,999

11%

\$5 million or more



2017 Projected Mosquito Management Revenue

70%

\$49,999 or less

19%

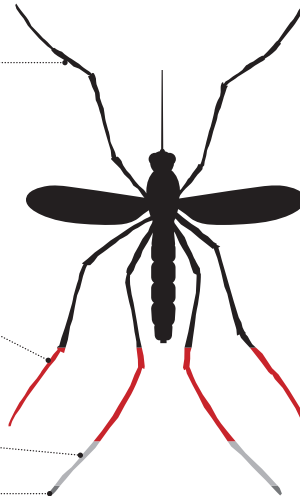
\$50,000 to \$99,999

9%

\$100,000 to \$999,999

2%

\$1 million or more



Number of Technicians

70%

Fewer than 10

26%

10 to 99

4%

100 or more

MOSQUITO MANAGEMENT REVENUE BY STRUCTURE TYPE



35% generate 25% or less of their mosquito management revenue from residential

9% generate 26% to 50% from residential

56% generate 51% or more from residential



88% generate 25% or less of their mosquito management revenue from commercial

7% generate 26% to 50% from commercial

5% generate 51% or more from commercial



94% generate 25% or less of their mosquito management revenue from govt./municipal

4% generate 26% to 50% from govt./municipal

2% generate 51% or more from govt./municipal

2017 MOSQUITO MANAGEMENT SUPPLEMENT

CONTINUED FROM PAGE MM12

quips. To manage customer expectations, he provides handouts to teach them the importance of checking flowerpots, removing leaves from gutters, etc.

“You have to work with customers and let them know what their job is, too — unless you’re going to provide that service for them,” he adds.

Mosquito Joe’s Garrison says even in markets where Zika-carrying *Aedes* mosquitoes are not present, customers are still concerned. This is a double-edged sword, he warns.

“We’ve been careful to position ourselves. We’re not experts in Zika, but we *are* experts in mosquito control,” he continues. “We added a page to our website last year that gave Zika information, and we made it a point to only reference information from established sources like the CDC (U.S. Centers for Disease Control and Prevention) and WHO (World Health Organization).”

Annis says that while Advanced Services saw a temporary spike in mosquito control interest during the most intense period of Zika coverage last summer, calls have been more about outdoor enjoyment than potential disease.

“The main thing is really not being able to enjoy your backyard deck or working in your yard without getting 20 bites that end up itching,” he says.

ADDITIONAL OPPORTUNITIES

The flip side of dealing with today’s customers is that public health awareness has increased, thanks to the wealth of information (and, unfortunately, misinformation) available online and through a variety of other media channels. In fact, the increase in public health awareness was ranked by *PMP* survey respondents as the top opportunity for the 2017 mosquito season.

Ranking second in the survey for top opportunities: More clients are giving repeat business and/or referrals for mosquito work. The two main markets for which Bert Putterman, a vice president of Rentokil, is responsible are Puerto Rico and the Dominican Republic. While

implementing a large-scale project this year in Caguas, Puerto Rico, he noted that he and his team learned a lot about the nature of mosquito work.

“We soon realized it’s imperative to inspect the heck out of properties and remove all the breeding sites you can possibly remove. We’re basically cleaning garbage out of yards,” he says. “We’re asking ‘Do you want this? Can we move it? Can we move it to the curb for the garbage truck to haul away?’ They will pay you to haul it to the street, just so they don’t have to do it themselves.”

FOCUSING ON THE FUTURE

Does the future of mosquito work include drones? Putterman thinks so.

“Drones are terrific for looking at roofs, and potentially treating them,” he explains. That said, the public’s need for privacy — which sometimes escalates to paranoia — is a big hurdle for drone use. Putterman says his team has used police escorts in situations where an abandoned home’s swimming pool is a mosquito breeding ground. But first, they use a drone to identify the biggest problem areas so they can get in, treat, and get out.

“I think Zika will continue to blow up in the mainland United States this year,” Putterman predicts. “It’s now in the blood system. We’re going to see it in a band across the country where there’s heat and humidity.”

Annis agrees, adding mosquito prevention and control should become routine for many PMPs. “Incorporating it into our regular service builds the value we represent to the customers, so they will hopefully keep us as their provider for years and years to come,” he says.

Bisaillon says proceeding with caution is your best bet. “Mosquito work is profitable. It’s huge, but it’s not a slam dunk. It’s got its own separate considerations to take into account.” *PMP*

You can reach GOOCH at hgooch@northcoastmedianet or 330-321-9754.

PRO TIPS

RAVI SACHDEVA:

I have trained one of my customer service representatives (CSRs) to answer any mosquito-specific customer questions and concerns. She has the ability to priority-schedule mosquito treatments with up to five technicians.



MIKE TULLOS:

Each of our technicians is trained in mosquito services, but we often set up full days where we send one tech out to service only mosquitoes that day.



BERT PUTTERMAN:

We emphasize source reduction, sanitation and exclusion as critical issues in effective mosquito control. Eliminate standing water and breeding sites where possible; cut away grasses and excess foliage; larvicide under ground cover; and make sure window and door screens are effectively tight. If you do this effectively, you will reduce populations immensely.



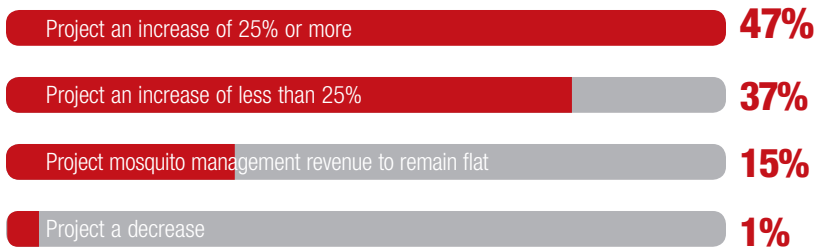
BRIAN GARRISON:

There are mosquitoes out west, and the basic approach is not much different from that in eastern regions: You eliminate the breeding sites, treat the sites you can’t eliminate, and treat the resting/loafing areas.

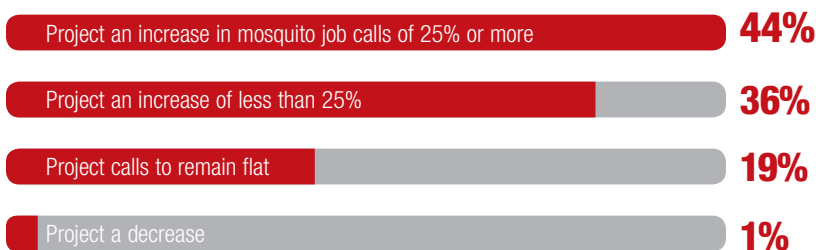


SOURCE: PMP ONLINE SURVEY CONCLUDED FEB. 2017 WITH 110 RESPONDENTS

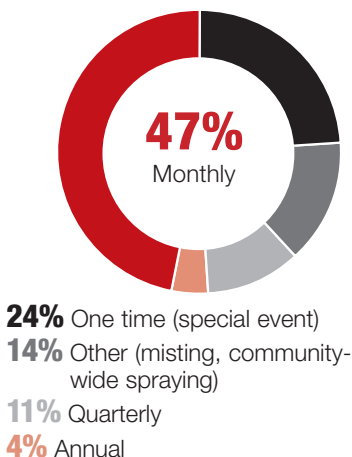
Mosquito Management Revenue Projected change 2017 vs. 2016



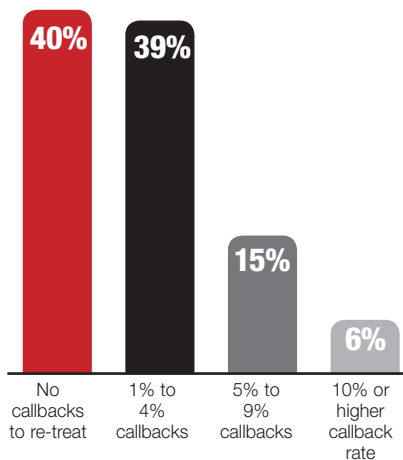
Mosquito Job Calls Projected change 2017 vs. 2016



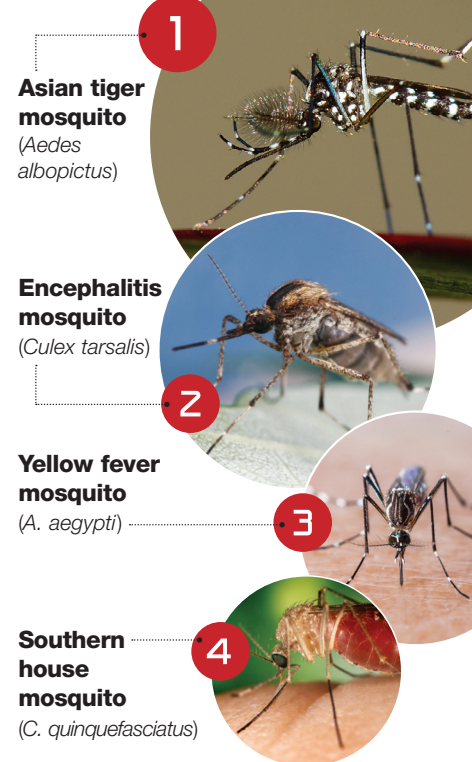
Mosquito Management Service Frequencies (in order of customer requests)



2016 Mosquito Management Callbacks



Top 4 Mosquito Species by Number of Jobs & Revenue Generated



More than **42,000** individuals with lab-confirmed cases of Zika virus have been reported in the United States and its territories as of February 2017. More than **4,600** pregnant women in the United States and its territories have lab evidence of a Zika virus infection.
SOURCE: U.S. CDC

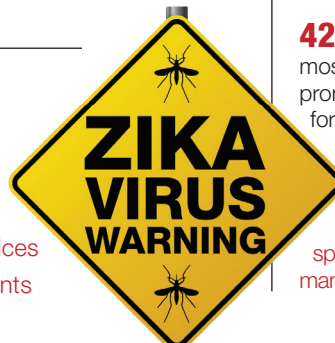
79% of respondents who perform mosquito work say news of the Zika virus helped boost the number of mosquito management service calls they received in 2016.

42% of respondents who perform mosquito work confirm that their promotional and advertising materials for mosquito management mention the Zika virus.

55% of respondents who perform mosquito work say their customers specifically ask whether their services manage mosquitoes that carry Zika.

Mosquito Management Job Generators

- 1 Add-on service for current general pest management clients
- 2 New clients requesting mosquito management services
- 3 Add-on service for current termite management clients





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