Project Title: Community-based management of mosquitoes in Tucson: The Midtown Mosquito Pilot Project

Project Leader: Elizabeth Willott
Project Collaborators:
Tim Dennehy (UA Entomology), Nancy Laney (Tucson Botanical Gardens)

Project Location: Metropolitan Tucson

Within the past decade, mosquitoes have emerged as an increasingly severe problem in metropolitan areas within Arizona. This change has been attributed to people creating favorable microhabitats for mosquitoes. Elected officials and community members in midtown Tucson neighborhoods, such as the one in which we propose to conduct this pilot project, are concerned for two reasons. First, in 2006 they were notified they were located within or adjacent to zones designated by the Pima County Health Department as being high risk for West Nile. This virus, vectored by *Culex quinquefasciatus,* is a serious threat to human health.

Second, after a number of decades of relative absence in Tucson, *Aedes aegypti* has returned and flourishes in their neighborhoods. Biting of this mosquito has become so severe that residents often find it necessary to change their behaviors: Arizonans with a lifelong tradition of spending summer evenings living, cooking, and eating outdoors at their residences have, in heavily impacted neighborhoods, been driven indoors by the ankle-biting *A. aegypti*.

There is broad recognition that communities must be involved in mosquito management. A single breeding site, such as an unattended swimming pool, or even a wheelbarrow or bucket that has collected rainwater, can produce thousands of adult mosquitoes that disseminate throughout a neighborhood. Thus, it is clear that our mosquito problems cannot be ameliorated solely by top-down, government-based programs.

Pilot Program

In 2006, we were contacted by the Tucson Botanical Gardens (hereafter, The Gardens) and asked to investigate options for mitigating mosquito problems in their neighborhood. The Gardens has a long tradition of promoting conservation issues, especially relating to pesticides, water, and alternative energy resources, and they sought innovative, conservation-based approaches to emerging midtown mosquito problems. After a year of documenting the severity of the problem, we proposed to establish a pilot mosquito abatement program centered at The Gardens. The Gardens' personnel will work with us and with the community. The program involves: (1) creation of up-to-date educational materials (paper[1], web, and power-point); (2) workshops tailored toward (a) Gardens' personnel working on the project, (b) Gardens' neighbors, and (c) the public, and county health team and other stakeholders; (3) facilitation of cooperation and

[1] This includes updating U of A Cooperative Extension bulletin AZ1311 Insect Repellents, with Dawn Gouge and Carl Olson, and U of A Cooperative Extension bulletin AZ1221 Mosquitoes, with Dawn Gouge, Carl Olson and Paul Baker.

positive incentives for neighbors to eliminate their local mosquito sources; and (4) evaluations, conducted by The Gardens, of our project impact and short-comings.

The Gardens' Contribution

The Gardens is a highly sought-after venue for outdoor weddings, dinners, and meetings held in the evening hours. As a major stakeholder in the neighborhood, quite obviously they wish to reduce the degree to which mosquitoes are feasting on their visitors. However, The Gardens' involvement in this project extends beyond self-interest. It has a long-standing positive community presence. They routinely meet with the neighborhood association and know many of the homeowners. The Gardens have already hosted mosquito workshops and they welcome continued collaboration.

The Gardens is willing to contribute paid and volunteer personnel to this effort and seek no funding from the project for personnel. They are also willing to provide support as they can in printing pamphlets, handout materials, a venue for meetings, and other logistic support. The Gardens will also sponsor a phone line that interested citizens can call for further information or to become more involved in the project. So, The Gardens will contribute considerably to this project; we wish to take advantage of this opportunity.

County, State, and Extension Involvement

This pilot project will also contribute to Pima County health initiatives to monitor mosquitoes in the Tucson area. In our monitoring we will capture adults that will be sent to the State Health Department for testing for West Nile and other viruses (if pertinent). Also, County personnel, others involved in the County-level SWAT team, and interested Master Gardeners or U of A Extension agents will be encouraged to attend the training workshops that will be provided. Willott has been doing 1-2 training sessions per year for the County for the past 2 years and has accepted to be the County - U of A WN coordinator for the coming year.

Other Leveraging

Willott currently has a small grant with Drs. Comrie, Paul, and Robbins in the UA Geography Department. The grant funds study of the human geography vis-à-vis the mosquito (what attitudes and beliefs are held by those responsible for mosquito management in Tucson); model building and substantiation. For the latter, the grant covers trapping at approximately 30 sites distributed on 3 routes in Tucson. There is no overlap of the aims of that grant and this pilot project. However, the proposal here allows leveraging of that grant money since the measure of efficacy of the pilot project at The Gardens is a comparison of adults caught at The Gardens compared to adults caught at control sites. Throughout the summer of 2006, approximately 30 sites and The Gardens were monitored 3 times. These data provide a baseline with which to compare future mosquito numbers in the pilot project area.

Educational Outreach

<u>Meetings and Workshops Specific for the Pilot Project</u>
a) Organizational and planning monthly meetings with key personnel at The Gardens.

b) Education workshop for The Gardens' personnel on biology of mosquito, aims of the plan, and importance of source (larval) reduction
c) Late spring (May) source reduction meetings/workshops aimed at neighborhood homeowners and any other interested members of the general public
d) Monsoon-season (late June, early July) source reduction meetings/workshops (as above)
e) Late season community meeting to evaluate impact, shortcomings, and discuss possible improvements.

Other Meetings/Workshops
At least one species identification workshop targeted for government agencies of Tucson Basin and for key personnel from The Gardens, from the Master Gardener program (John Begeman is on sabbatical—attempts to reach him on this have so far not been successful), or from U of A Extension or other institutions

Publications
a) Updated U of A Extension bulletins (see footnote 1 for specifics. Revision of these has started; funding for publication is expected to come from other U of A sources.)
b) Updated mosquito materials on the U of A Urban Entomology website and links to same from The Gardens' website
c) Gardens' sponsored website on the project (Willott will likely work with Tana Jones)

Data Collection

This has two purposes: (1) to identify larval habitat and either eliminate or treat same; and (2) to survey adult mosquitoes to monitor efficacy of the project, since it is the adults that are the nuisance and threat.

(1) We (Willott, Dennehy, Laney) will visually survey to pinpoint likely larval habitats in the neighborhood, and we will leverage our inputs by training project personnel to do the same. Problem sites will be a key focus of the meetings and workshops with The Garden personnel and neighbors.

(2) We wish to document our efficacy. As mentioned above, we have baseline data from our trapping of 2006 at The Gardens and from trapping at other sampled sites. The efficacy of our interventions will be tested by comparing data obtained from the Gardens with data from these other sites (where intervention is not routinely occurring, but which are trapped by either Elizabeth Willott or county personnel).

Trapping to survey host-seeking mosquitoes will be with standard, dry-ice baited CDC traps. The CO_2 acts as an attractant, mimicking a host. We currently have about 25 functional traps (plus a few parts). We anticipate trapping monthly at The Gardens during the mosquito season (the Geography grant allows for trapping ~30 other sites that serve as controls).

In addition, two other traps will be used for highly specific purposes. A gravid trap in Tucson attracts not only gravid mosquitoes but all kinds—unfed and nectar fed females and also males (a plume of moist, cool, rich-smelling air seems to be a serious attractant). This trap sometimes

helps pin-point source infestations; abundance of males indicates a nearby larval source, even if one is not easily visible (it may be over a fence or it might be a plugged gutter that is not visible from the ground). An oviposition trap (fancy term for glass canning jar painted black, lined with plant potting paper and filled with fermented hay solution) will be used for both educational and scientific purposes. Many people are not aware how easy it is to grow mosquitoes and this low-cost device gives us a ready supply of larvae for education purposes as well as helps us identify problem areas. Once eggs are laid, a modified canning jar lid (metal insert in the lid is replaced by netting) will be placed on each jar.

Budget

1. Expenses for Educational Outreach (Note: much of the Outreach expenses will be covered by the Gardens, some specifics were noted above)
   - Printer cartridges, poster printing costs, photocopying $ 300
2. Publication
   - Mosquito bulletin; Insect repellent bulletin: Alternate funds (ECAT) will be sought
3. Mosquito trapping supplies
   - • Dry ice for trapping $ 700
   - • Replacement of damaged traps, batteries $ 800
   - • Small supplies and minor incidentals $ 310
   - • Mileage reimbursement for trapping $ 178
4. Related costs
   - • Mileage costs to AZ State Vector Meeting 250 miles $ 111
   - (Dawn Gouge has graciously offered to provide accommodation)
   - • Partial coverage of ESA meeting registration and expenses $ 250
   - • 1/2 of American Mosquito Control Association membership $ 60
   - (other funding will cover remaining 1/2)
5. Supplemental Comp to Elizabeth Willott[2] to partially cover for time involved
   - Before July: $ 3300 salary plus 25.8% ERE ($851.40) $ 4,151
   - (We are seeking further funding to cover her time after July)

Total Requested **$ 6,860**

Budget Rationale: Willott is charging **20** hours time for administration and organizing meetings and planning with Gardens' and Midtown Community personnel; **20** hours time for revision and preparation of paper materials, including leading revision of the Extension Bulletins; **20** hours of her time to creating and building 3 different types of oral presentations (a simple 5-10 minute presentation accompanied by a few powerpoints or simple posters; a 20-40 minute presentation for community presentations; and a 40-50 minute presentation for County and other personnel for whom more knowledge is needed) and notes for proposed revisions to the web-site; **20** hours for actual time spent in workshop events and presentations; and **20** hours for time spent organizing, trapping, ID'ing, and documenting results found at the Gardens (the time expended on this will exceed 20 hours considerably). The remainder of her time spent on this project is, at this point, being donated. Control trapping done elsewhere is covered (minimally—

[2] Willott is currently being paid as 0.50 ETE for teaching. She is requesting partial compensation for her work on this project.

compensating her at approximately 1/2 the rate for her time for trapping, ID'ing, and documenting) by the small grant with Geography.

Supporting Documents

Attached are letters of support from:
• Nancy Laney of the Tucson Botanical Gardens
• Craig Levy, Arizona Dept of Health Services, Vector-borne and Zoonotic Diseases
• Lisa Hulette of Pima County Health Department
• Dawn Gouge and Carl Olson of the Dept of Entomology (regarding updating brochures; Paul Baker has given verbal support, I can ask him for an email if you wish)

Tucson Botanical Gardens

February 18, 2007

Dr. Elizabeth Willott
Department of Entomology
University of Arizona
Tucson, Arizona 85721

Re: Community-based management of mosquitos in Tucson: The Midtown Pilot Project

Dear Elizabeth:

I am writing to express the strong support of the Tucson Botanical Gardens for the Midtown Mosquito Pilot Project. We are delighted to be collaborators on this important project which we believe will benefit our midtown neighborhood as well as provide a model for mosquito abatement programs throughout Tucson.

We will be providing considerable inkind support to the project including paid and volunteer staff time, venue for meetings, logistical support, and certain materials. The Gardens' administrators have worked diligently to develop positive relationships with the surrounding neighbors which will be important to the success of this project.

We are very grateful for your interest and assistance in developing this pilot project in collaboration with Dr. Timothy Dennehy from the Department of Entomology and Cooperative Extension. The scientific expertise and outreach experience of our University collaborators, combined with the Gardens' knowledge of community education and outreach make this an extremely promising project.

I look forward to working with you in the months ahead.

Sincerely,

Nancy

Nancy R. Laney
Executive Director

2150 N. Alvernon Way
Tucson, Arizona 85721
520.326.9686

PIMA COUNTY HEALTH DEPARTMENT
COMMUNICABLE DISEASE PREVENTION, SUITE 1340
3950 S. COUNTRY CLUB RD, SUITE 100 • TUCSON, AZ 85714-2056
(520) 243-7797 FAX (520) 791-0366

February 28, 2007

Dear Selection Committee :

Public health agencies all over the United States have been looking for opportunities to affect the actual risk of contracting mosquito borne illnesses since the appearance of West Nile virus in 1997. The proposed project: Community-based management of mosquitoes in Tucson: The Midtown Mosquito Control Project is exactly the kind of program we believe will have such an effect. Community based education programs have the possibility of significantly decreasing the amount of human illness attributed to the West Nile virus.

I am happy to provide this letter of support for this proposed project. I believe it fits right in with the Pima County Health Department's goal of promoting consistent responses to mosquito management throughout the county. The model could easily be adapted and used almost anywhere in the county.

Sincerely,

Lisa Hulette, Epidemiology Manager
Pima County Health Department

From: Elizabeth Willott <willott@u.arizona.edu>
Date: March 1, 2007 3:11:20 PM MST
To: Al Fournier <fournier@Ag.arizona.edu>, Peter Ellsworth <peterell@Ag.arizona.edu>
Cc: "Timothy J. Dennehy" <tdennehy@Ag.arizona.edu>, Nancy Laney <execdirector@tucsonbotanical.org>
Subject: Re: Willott-Dennehy-Laney

Hi Al and Peter,

Here's the revised submission and pdfs of the supporting letters. The letter of support from the County Health I know is barely legible—Lisa faxed me the letter (dept fax machine did not do a good job printing). Sorry. If that's an issue I can ask Lisa to send another or perhaps if you have questions you should contact her directly at Lisa.Hulette@pima.gov The County Health Dept is still settling from moving to their new building and this morning was the County and City's West Nile Summit (morning conference on West Nile) so I know she has been and is busy but if you wish I can ask her to resend directly to you or save as pdf and attach. Lisa is the Countywide West Nile Virus coordinator.

Elizabeth

From Craig Levy, Arizona Dept of Health Services, Vector-Borne and Zoonotic Diseases

Elizabeth
I support your proposal to work with the Botanical Garden staff in addressing mosquito problems in Tucson neighborhoods. Last year 150 human cases of West Nile virus were reported in Arizona, of which 47 occurred in Pima County (mostly in Tucson). During outbreak investigations, we have observed that a lot of Arizona's mosquito problems are coming from backyard clutter making mosquito control more difficult. You proposal to conduct local education & outreach, and to involve communities in mosquito control makes a lot of sense. Monitoring mosquitoes throughout the effort will help measure efficacy of these efforts.
The Arizona Department of Health Services - Vector-Borne & Zoonotic Diseases Program (ADHS-VBZD) may be able to help in terms of speciating, counting and testing some adult mosquito samples that are collected within the target area. Testing (by PCR at the Arizona State Health Laboratory) is done for West Nile and St. Louis encephalitis viruses. Priority for testing will be for Culex species.
I wish you success in your proposal and look forward to working with you.
Bye

From Dawn Gouge
Dear members of the Arizona Pest Management Center,

I would like to indicate my support of the proposal submitted for funding by Tim Dennehy, Elizabeth Willott, and Nancy Laney. This proposal addresses an area of critical need. The proposal includes local outreach efforts as well as a revision of extension materials used state-wide. The Insect Repellant publication has been distributed by representatives of the EPA nationally and an update was requested last year.

Involving local stakeholder groups and the community in general will generate a local awareness and grassroots effort towards sustainable mosquito management. In the past 2 years Department of Health (Vector Borne and Zoonotic Disease) outreach efforts have been dramatically reduced. Currently, Vector Control departments state-wide are critically understaffed and in crisis.

Please give your full support to this proposal, thank you,

Dawn H. Gouge
Urban Entomologist
University of Arizona
(520) 381-2223

From Carl Olson
Dear Dr. Willott:

I am happy to collaborate with your team in reworking bulletins concerning repellents and local mosquito biology, adding new information and possibly shortening them and aiming such bulletins at a particular target audience. The bulletins as now written are good, but may possess too much material for the general public, and a revision and shortening could be very valuable as the potential mosquito problems grow.

Thank you for including me as a participant in this project.

Regards,
Carl
--
Carl A. Olson, Associate Curator
1140 E. South Campus Dr.
Dept. of Entomology
University of Arizona
Tucson, AZ 85721
FAX (520) 621-1150 Office (520) 621-5925
e-mail bugman@ag.arizona.edu
Many people will walk in and out of your life, but only
true friends will leave footprints in your heart.

From Nancy Laney, The Tucson Botanical Gardens

From Lisa Hulette, Pima County Health Department, West Nile Virus Coordinator

ARIZONA COOPERATIVE EXTENSION

THE UNIVERSITY OF ARIZONA • COLLEGE OF AGRICULTURE AND LIFE SCIENCES

Community Based Management of Mosquitoes in Tucson

(Dennehy, Willott, Laney)

SITUATION	INPUTS	OUTPUTS		OUTCOMES – IMPACT		
		Activities	Participation	Short	Medium	Long Term
What is the problem or need? Need to develop a community-based program for mosquito awareness and management. Mosquitoes are more than a nuisance, they are a health threat. West Nile virus hit Tucson hard in 2006 and may continue in 2007; dengue is just across our southern border; preparation is needed for Aedes albopictus introduction.	*What we invest* We request funds for supplementary salary support for Elizabeth Willott (currently paid as lecturer 0.5 FTE) to allow her to continue mosquito work and participate in the interagency SWAT team. We also request funds for basic trapping supplies, workshops, and auxiliary materials. Willott, with cooperation from Dennehy and Laney, will run workshops, do or coordinate trapping, She will revise (in collaboration with Dawn Gouge) the mosquito brochure and website.	*What we do* • Workshops at Tucson Botanical Gardens and for Master Gardeners • Mosquito ID workshop for County, TUSD, City Parks, DM, and other personnel • Trap TBG & Sweetwater to monitor mosquitoes and our effectiveness • Update mosquito management brochure and website; distribute statewide and via web to diverse agencies • Complete paper on host-seeking timing	*Who we reach* • Individual citizens • TBG members and neighbors • Community organizations, Pima Council on Aging, churches • Educators who can make a difference (Master Gardeners as one example; extension agents, via the brochure, another) • County, TUSD, City Parks, DM, and other personnel involved in mosquito management in Pima County	*What the short term results are* • Lessening of mosquito problems in at least part of Tucson • Improved understanding of mosquito species and problems by ordinary citizens, educators, and County and other personnel in mosquito management • Improved mosquito ID skills for people involved in mosquito management, so efforts can be focused on those posing greater risk	*What the medium term results are* • Improved mosquito management longer term, especially in residential areas where some residents (elderly in particular) may need assistance. • Increased public participation in community-based management • Organizational structure created for disseminating further info about mosquito management (or other IPM issues)	*What the ultimate impact(s) is* • Better educated and more self-reliant citizens and communities • Improved human-nature awareness and ability to respond (to WN or dengue or Aedes albopictus threats)