



Communicating about Effective Mosquito Control

Tailor Made For Our Community



The Association of State and Territorial Health Officials

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Tailor Made For Our Community

Introduction

The Association of State and Territorial Health Officials (ASTHO) and the Centers for Disease Control and Prevention (CDC) are pleased to offer this guide to states and communities across the nation that wish to explore and expand their capacity in mosquito control. Building support for an appropriate and scalable program is not an easy task. The tools in this kit were designed to further your efforts and ease the process based on research and expert marketing guidance. A few minutes reviewing this kit and using the information in it may save you hours of work down the road.

Mosquito-spread diseases can impact human health, animal health, tourism, outdoor recreation and fitness, and even natural disaster recovery efforts. But many at-risk communities do not have adequate protective programs in place today. ASTHO and CDC developed the tools in this guide to help mosquito control partners educate others about the need for adequate mosquito protection. A range of research activities and expert judgment were sought to involve policymakers and community decision-makers in the creation of this guide.

MOSQUITO CONTROL PROGRAMS VARY

Varying geography, movement patterns of mosquitoes, local climates, and differing incidence rates for West Nile virus (WNV) and other human health effects are all factors that show why mosquito control programs need to match the local risk of infection. Communities also vary in how local economies can be affected by either infectious or nuisance mosquitoes. Some communities depend heavily on tourism, outdoor recreation, and the livestock industry.

Other communities can be severely impacted by the health care costs of mosquito-spread diseases, whether from regular outbreaks or from outbreaks following natural

✦ Mosquito-spread diseases can impact human health, animal health, tourism, outdoor recreation and fitness, and even natural disaster recovery efforts. When communities do not have adequate protective programs, people, businesses, governments, and pets are all at risk.

disasters. The factors that determine risk of infection and threats to local economies illustrate the local nature of mosquito control programs.

INVOLVE MULTIPLE STAKEHOLDERS

These factors also determine if citizens, community groups, churches, schools, businesses, and policymakers and can be mobilized to action. As you develop your program, it is critical to involve multiple stakeholders in your efforts. It is also important to develop close relationships with unusual partners, examples of which you will find listed in the Impact Fact Sheet backgrounders. Lastly, those who have sustainable mosquito control programs strongly advise others to develop relationships with environmental advocacy groups to address concerns about environmental hazards early on. A more detailed document, *Public Health Confronts the Mosquito*, provides excellent guidance on how to involve others in your effort. You can find it at this link <http://www.astho.org/pubs/FinalReportPDF.pdf>.

An important note from the research is that communities need to develop a mosquito control program that is *appropriate to the local threat*, and *scalable* should the situation change. We created a three tier scalable system, based on *Public Health Confronts the Mosquito*. These tiers are explained in more detail in each Impact Fact Sheet. The research strongly argues for at-risk communities to start by developing a Tier One program for mosquito monitoring and prevention. Scaling up to Tier Two and Tier Three can then be applied should the data from Tier One show a need for change.

Please take a few minutes to review this guide and consider how you might use these tools in your community to bolster support for a community-based mosquito control program. The guide includes research highlights, five different Impact Fact Sheets, fact sheet backgrounders, cross-promotional environmental health messages, preferred language, social math facts, and innovative financing information.

Please visit the ASTHO Web site (www.astho.org) or CDC Web site (<http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>) for additional information and tools.

✦ Communities need to develop a mosquito control program that is appropriate to the local threat, and scalable should the situation change.

Using the Impact Fact Sheets

Community leaders and policymakers are influenced mostly by issues that have multiple stakeholders and multiple benefits for their jurisdiction. This suggests that mosquito control advocates must present data on multiple issues that are impacted by mosquitoes. Focusing only on the health impacts will make it harder for a traditionally low priority issue, like mosquitoes, to be valued. Additional impact issues, along with human health impacts, can attract and interest more stakeholders in communities and form a more robust foundation of support.

This research also suggested that involving the business community is critical for support. Impact Fact Sheets were developed with this in mind. Each Impact Fact Sheet focuses on the economics of an industry threatened by infectious or nuisance mosquitoes. These potential economic impacts may immediately and directly impact businesses, but also affect a community as a whole. Impact Fact Sheets can be used to introduce your local business community, community leaders, and policymakers to mosquito control issues. Be careful to choose the Impact Fact Sheet that best matches your local business conditions. The following topics were selected based on input from the research, CDC, ASTHO, and expert marketing judgment. An Impact Fact Sheet was created for each topic.

- ✦ **Human Health**
- ✦ **Animal Health**
- ✦ **Outdoor Living (local residents)**
- ✦ **Tourism (visitors)**
- ✦ **Natural Disasters**

- ✦ **Impact Fact Sheets can be used to introduce your local business community, community leaders, and policymakers to the mosquito control issue.**
- ✦ **You may wish to customize the Impact Fact Sheet with data and photographs more consistent for your state or local area.**

Each Impact Fact Sheet includes 10 specific messages or message components:

1. How mosquitoes are linked to an economic issue of interest to a specific locale
2. The economic impact of the issue, not mosquitoes, on the selected state and the U.S.
3. Social math examples to highlight the economic impacts (e.g., comparing costs of WNV to child care insurance coverage in the human health Impact Fact Sheet)
4. Graphic “Did You Know” box with related economic impact information
5. Strong positive visuals of the economic issue – not of mosquitoes
6. Strong metaphors for describing what monitoring mosquitoes means – e.g., like weather tracking
7. Emphasis on the scalable and community-based nature of mosquito control
8. Use of preferred language, such as “monitoring” versus “surveillance,” or “scalable” versus “comprehensive”
9. Reminder that the entire community needs to be involved
10. Series of next steps for community leaders, policymakers, or advocates

For each Impact Fact Sheet we selected a few states to use as examples in the text. These states were chosen primarily because they had a high incidence of West Nile virus. We also selected states from across the U.S. The Impact Fact Sheets also include national statistics, but the research for this project strongly indicates that local or state level data is more compelling to businesses, policymakers, and community leaders. Because this is a local issue, you may wish to customize the Impact Fact Sheet with data and photographs more consistent for your state or local area.

To create your own custom Impact Fact Sheets, original electronic graphic files are available online at www.astho.org in Adobe InDesign format. Most graphic designers can easily download and use these files. If you need assistance with copywriting or graphic design services for customizing Impact Fact Sheets, please contact ASTHO’s Environmental Health Department for further information.

HOW TO USE THE IMPACT FACT SHEET BACKGROUNDER

Each **Impact Fact Sheet** provides local facts, when available, for five specific topics across many different states. The following Impact Fact Sheet backgrounders provide the basic information we collected to develop each fact sheet. If you decide to customize the Impact Fact Sheets for your community, these background documents are a useful template for collecting the kind of information you

will need. There is also additional information in the backgrounders that may be useful to your local efforts. For example, we included a list of potential partners related to the economic issue at hand. This list of “unusual partners” is designed to provide you with ideas for where to find additional support in your state. We also provided Web site links to important source documents.

Human Health and Mosquitoes Impact Fact Sheet Backgrounder

Economic Impact Focus	Human health and the associated health care costs
Focus for Fact Sheet	Louisiana and South Dakota were selected because they were among the top ten states for WNV incidence in 2007. West Nile virus was selected because it is the highest profile U.S. disease associated with mosquitoes and can cause significant health care costs if not controlled quickly. Also health care costs are a major concern to most states, including Louisiana and South Dakota.
Photo Example	Healthy people, especially youth because youth photos are appealing
Facts on WNV Impact in Louisiana	In 2002, a total of 4,156 WNV cases were reported in the United States; 329 were in Louisiana. The estimated cost of the Louisiana epidemic was \$20.1 million from June 2002 to February 2003, including a \$10.9 million cost of illness (\$4.4 million medical and \$6.5 million nonmedical costs) and a \$9.2 million cost of public health response.
Facts on WNV Impact Nationwide	<p>An analysis of costs from a 2002 Louisiana outbreak showed the short-term inpatient care costs of WNV was about \$4 million. Extrapolating that across the U.S., the authors concluded that the short-term nationwide medical care costs would have been about \$61 million in 2002.</p> <p>This \$61 million might otherwise be better used to provide health insurance to more than 51,500 children across the U.S. each year. (Social math example.)</p> <p>Further, mosquitoes can carry encephalitis and other illnesses, increasing their impact on health and health care costs.</p> <p>The risk of Dengue fever, chikungunya fever and other mosquito-related diseases increases with poor mosquito control. While these diseases may sound exotic and foreign, globalization and modern day travel are making U.S communities more vulnerable to these diseases and associated health care costs every day.</p>
Sources of Information	<p>West Nile virus economic impact, Louisiana, 2002, Emerging Infectious Diseases, Oct, 2004 by Armineh Zohrabian, Martin I. Meltzer, Raoult Ratard, Kaafee Billah, Noelle A. Molinari, Kakoli Roy, R. Douglas Scott, II, Lyle R. Petersen</p> <p>In 2004, the average annual premium for private health insurance for children under 18 was \$1,183. See America's Health Insurance Plans, "Individual Health Insurance: A Comprehensive Survey of Affordability, Access, and Benefits," August 2005, p. 5, at www.ahipresearch.org/pdfs/Individual_Insurance_Survey_Report8-26-2005.pdf</p>
Suggested Partners	<p>Health care organizations</p> <p>Health insurance organizations</p> <p>Elementary and secondary schools</p> <p>Public health schools</p> <p>Nursing schools and organizations</p> <p>Senior citizens organizations – local AARP chapters</p> <p>Foreign travel organizations</p>

Animal Health and Mosquitoes Impact Fact Sheet Backgrounder

Economic Impact Focus	Animal (livestock) health and costs associated with the industry
Focus for Fact Sheet	<p>Texas, Colorado and Missouri were selected as examples because they have high incidence of West Nile Virus. Texas also has high levels of mosquito-related diseases in horses. Texas had 29 eastern equine encephalitis (EEE) cases and 94 equine West Nile Virus (EWNV) cases in 2007 - almost 10% of the total 206 EEE cases and over 20% of the EWNV caseload (USDA NAHRS report).</p> <p>The horse industry was selected because horse health is at risk if infectious mosquitoes spread diseases; because horses are a pastime that many enjoy; and because the horse industry is economically important to Texas, Colorado, and Missouri, as our examples.</p>
Photo Example	Horses in countryside
Facts on Horse Industry Impact in Texas, Colorado, or Missouri	<p>There is no treatment for West Nile virus (WNV) once a horse becomes infected. About two out of every three horses that become ill will survive.</p> <p>The economic costs of WNV in Texas can be estimated at \$2,300 per horse (citation: Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries:2002 http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine/wnv2002_CO_NB.pdf)</p> <p>A 2002 study in Nebraska and Colorado showed that the costs of WNV on the horse industry alone was over \$1.2M (Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries:2002 http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine/wnv2002_CO_NB.pdf)</p> <p>The horse industry contributes approximately \$39 billion in direct economic impacts to the U.S., \$5.2 billion to Texas, \$1.6 billion to Colorado, and \$1.3 billion to Missouri economies. source American Horse Council 2005 survey at http://horsecouncil.org/economics.html)</p>
Facts on Horse Industry Nationwide	<p>There is no treatment for WNV once a horse becomes infected. About two out of every three horses that become ill will survive. For horses that survive, a full recovery is likely. Horses vaccinated against eastern equine encephalitis, western equine encephalitis, or Venezuelan equine encephalitis are NOT protected against WNV.</p> <p>The total number of U.S. equine West Nile virus cases in 2007 was 468.</p>
Sources of Information	<p>United States Department of Agriculture, http://www.aphis.usda.gov/vs/nahss/equine/wnv/2007_equine_west_nile_virus_final.pdf (2007).</p> <p>United States Department of Agriculture, http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine/wnv2002_CO_NB.pdf (2002).</p> <p>Report on the Texas Horse Industry by Texas A&M University, http://animalscience.tamu.edu/main/academics/equine/hrg014-industry.pdf (1998).</p> <p>State of Texas data http://www.governor.state.tx.us/divisions/ecodev/bidc/industryprofiles/files/profileagriculture.pdf (2008).</p> <p>American Horse Council 2005 survey at http://horsecouncil.org/economics.html</p> <p>USDA National Animal Health Reporting System at http://www.aphis.usda.gov/vs/ceah/ncahs/nahrs/</p>
Suggested Partners	<p>USDA Animal Health Division</p> <p>American Horse Council</p> <p>Texas Horse Council</p> <p>Colorado Horse Council</p> <p>Missouri Equine Council</p>

Outdoor Living and Mosquitoes Impact Fact Sheet Backgrounder

Economic Impact Focus	Outdoor Living- primarily in-state activities for residents - mountain biking, gardening, golf, etc.
Focus for Fact Sheet	<p>Montana and Nebraska were selected because they have high incidence of mosquito-related diseases.</p> <p>Biking was selected because it is an activity that is at risk of reduction if mosquitoes annoy residents and if infectious mosquitoes spread diseases. Biking is also an activity that a large number of Montanans and Nebraskans enjoy, and it has a large economic impact on those states.</p>
Photo Example	Biking
Facts on Biking Impact in Montana and Nebraska	<p>Over 30% of the population of Montana ride mountain bikes.</p> <p>Montana profits economically from mountain bike tourism. Two recent studies reveal information that mountain bike recreation provides a green and sustainable economy for rural communities surrounded by public lands. The findings document the economic power of mountain biking and verify the potential benefits for towns across the State.</p> <p>http://www.imba.com/resources/science/shimano_econ_impacts.pdf</p> <p>More than 60,000 jobs across Mountain States region are associated with bicycling</p> <p>http://www.imba.com/resources/science/outdoor_industry_bike.pdf</p> <p>Bike Ride Across Nebraska is an example of one bike ride event that attracts recreational dollars. The amount of money spent by riders has ranged from \$10,000 to \$16,000 each year. (source http://www.bran-inc.org/about.shtml)</p>
Facts on Biking Impact Nationwide	<p>50 million mountain bikers pump \$26 billion into the American economy – more an 1 1/2 times the actual total discretionary budget authority for NASA.</p> <p>Nationally, there are 1 1/2 times more mountain bikers than golfers. (http://www.imba.com/resources/science/shimano_econ_impacts.pdf)</p> <p>Contributes \$133 billion annually to the U.S. economy ¹</p> <p>Supports nearly 1.1 million jobs across the U.S.</p> <p>Generates \$17.7 billion in annual federal and state tax revenue (http://www.imba.com/resources/science/outdoor_industry_bike.pdf)</p>
Sources of Information	<p>http://www.imba.com/resources/science/outdoor_industry_bike.pdf</p> <p>http://www.imba.com/resources/science/shimano_econ_impacts.pdf</p> <p>United Bicycle Institute (lists all other bicycle organizations) http://www.bikeschool.com/links/</p> <p>League of American Bicyclists http://www.bikeleague.org/media/facts/#how_many</p>
Suggested Partners	<p>Montana Mountain Bike Alliance http://www.montanamountainbikealliance.com/about</p> <p>Local cycling clubs: Adventure Cycling Missoula, MT Yellowstone Valley Cycling Club Billings, MT Gallatin Valley Bicycle Club Bozeman, MT Helena Bicycle Club Helena, MT</p> <p>Western Canada Mountain Bike Tourism Association (MBTA)</p> <p>Nebraska Game And Parks Commission</p> <p>Nebraska Recreational Trails</p> <p>Bike Ride Across Nebraska (BRAN)</p> <p>League of American Bicyclists</p> <p>United Bicycle Institute</p>

Tourism and Mosquitoes Impact Fact Sheet Backgrounder

Economic Impact Focus	Tourism - primarily out of state tourism (to separate this from outdoor living activities) – including camping, park visits, rafting, kayaking, and other activities.
Focus for Fact Sheet	Wyoming was selected because they have one of the highest incidences of WNV. Camping and park visits were selected because these are activities that may be curtailed if infectious or nuisance mosquitoes spread. The potential decline in camping and park visits could have a negative economic impact on Wyoming.
Photo Example	Camping or state park visit (no landmarks in the photo)
Facts on Tourism Impact in Wyoming and North Dakota	<p>If not for the contribution of the tourism industry, every household in Wyoming would pay \$510 in additional taxes.</p> <p>Tourism supports 29,950 full time and part time jobs in Wyoming and provides 8.3% of sales tax revenue in Wyoming.</p> <p>Tourism accounts for 8.3% of Wyoming’s total state sales tax revenue. http://www.wyomingbusiness.org/pdf/tourism/2006_Impact_Report.pdf</p> <p>Tourism accounts for nearly 20% of North Dakota’s economic base.</p>
Facts on Tourism Impact Nationwide	<p>In total, out-of-area park visitors spent \$9.4 billion in the local regions surrounding surveyed parks in FY 2005.</p> <p>Visitor spending supports about 235,000 jobs in gateway regions http://web4.canr.msu.edu/mgm2/</p>
Sources of information	<p>Discover Impact of Tourism in Wyoming http://www.wyomingbusiness.org/pdf/tourism/2006_Impact_Report.pdf</p> <p>Links to State Tourism Organizations and Research Websites http://web4.canr.msu.edu/mgm2/state_tourism.htm</p> <p>Estimating North Dakota’s Economic Base https://www.ndtourism.com/uploads/resources/554/nd-econbase90-06.pdf</p> <p>National Park Visitor Spending and Payroll Impacts, Fiscal Year 2005 http://web4.canr.msu.edu/mgm2/</p>
Suggested Partners	<p>Wyoming Business Council http://www.wyomingbusiness.org/</p> <p>Wyoming State Tourism Office http://www.wyomingtourism.org/</p> <p>North Dakota Tourism Division</p> <p>Parks and Recreations Departments (state and local)</p> <p>Travel Industry Association http://www.tia.org</p> <p>American Automobile Association http://www.aaa.com/</p> <p>Go Camping America www.gocampingamerica.com/</p> <p>US Office of Travel and Tourism Industries http://tinet.ita.doc.gov/about/index.html</p>

Natural Disasters and Mosquitoes Impact Fact Sheet Backgrounder

Economic Impact Focus	Natural Disasters - primarily water-related events that threaten mosquito population increases and migration shifts
Focus for Fact Sheet	Mississippi and Louisiana were selected because they have a high incidence of West Nile Virus and flooding is a recurring problem. Flood clean-up activities were selected because those who conduct these activities can be exposed to infectious mosquitoes if preventive actions are not taken. Also, nuisance mosquitoes often increase after flooding, exposing local residents to nuisance and potentially infectious mosquitoes during difficult periods of recovery.
Photo Example	Flood water clean-up activities, not flooding
Facts on Natural Disasters	<p>After Hurricane Katrina, the number of reported cases of West Nile neuroinvasive disease (WNND) sharply increased in the hurricane-affected regions of Louisiana and Mississippi (Emerging Infectious Diseases. 2008 May;14(5):804-7).</p> <p>We used data on the costs of WNV from the human health and animal health Impact Fact Sheet backgrounders for economic facts because we could not find specific studies on the economic impact of WNV following a flood.</p>
Facts on Tourism Impact Nationwide	<p>After a flood, mosquitoes may be more abundant than usual and could pose potential health problems. Filth and debris left by a flood create excellent breeding conditions for mosquitoes, some of which may be capable of spreading diseases. http://www.cdc.gov/nasd/docs/d001501-d001600/d001565/d001565.html</p> <p>In the summer of 2008, there were 20 times the normal number of mosquitoes in Iowa, and in Chicago up to five times more than usual. (AP wire story July 3, 2008)</p> <p>The key to managing potential disease outbreaks is to first have a monitoring system in place so that professionals know the species of mosquitoes that may spread diseases. Mosquitoes can then be better controlled using the safest insecticide matched to the local mosquito species, This will better and more safely reduce young and adult mosquitoes before they can do harm to humans and animals (Public Health Confronts the Mosquito).</p>
Sources of information	<p>http://www.cdc.gov/nasd/docs/d001501-d001600/d001565/d001565.html</p> <p>Associated Press wire story July 3, 2008</p> <p>Public Health Confronts the Mosquito (http://www.astho.org/pubs/MCCRptoverview.pdf)</p>
Suggested Partners	<p>FEMA</p> <p>State and County Emergency Management or Preparedness Offices</p> <p>Churches and religious organizations that respond to disasters</p> <p>American Red Cross</p> <p>Military and National Guard units in local and regional area</p> <p>School systems</p> <p>www.TheReadyStore.gov</p> <p>Americorps</p> <p>Centers for Public Health Preparedness http://preparedness.asph.org/home.cfm</p> <p>Local and regional weather experts/TV personalities</p>

Environmental Cross-Promotion Messages

Research pointed to additional opportunities for promoting mosquito control key messages. Interviewees rated the top five environmental threats in their communities. Many reported that there were both *perceived and real* connections between various environmental threats and mosquito-spread diseases. Embedding mosquito messages into high profile environmental messages may increase visibility for mosquito control.

Beginning with the top five environmental concerns, we then selected the best opportunities for legitimate cross-promotion of mosquito messages based on the available evidence. These final topics included climate change and natural disasters. Take some time to visit with the advocacy groups that promote these issues and convince them to use your messages to provide additional support for their main issue. Adding messages like these to other environmental Web sites, documents, fact sheets, press releases, etc. will help build awareness about mosquito control.

CLIMATE CHANGE

- ✦ Mosquito control early warning systems help identify the best actions for reducing threats from mosquito-spread diseases that may occur due to extreme weather events.

- ✦ Climate change is likely to cause important changes in infectious disease patterns, including the potential for impacts on mosquito-spread diseases.¹ The U.S. will experience marked changes in weather patterns in coming decades, including warmer temperatures and increased rainfall, summertime droughts and floods.² Mosquito tracking or early warning systems can help identify changes in the spread of mosquito species and the movement of infectious germs that may threaten human health. This type of system can help public health and communities identify the best actions to contain the threat and reduce human exposure.

NATURAL DISASTERS

- ✦ Mosquito control early warning systems help identify the best actions for reducing threats from mosquito-spread diseases that may occur after flooding or during clean-up activities.
- ✦ Mosquito populations usually increase after flooding³, potentially increasing the risk of exposing humans and animals to diseases, and hindering recovery and clean-up activities. The health impacts of natural disasters hinge on the vulnerabilities and recovery capacities of the natural environment and the local population.⁴ An early warning system can help track mosquito population size, specific type of mosquitoes, and movement patterns. This can help ensure that the most appropriate action is taken when a natural disaster occurs.

- ✦ Many reported that there were both *perceived and real* connections between various environmental threats and mosquito-spread diseases.
- ✦ Take some time to visit with the advocacy groups that promote these issues and convince them to use your messages to provide additional support for their main issue.

¹ J Urban Health. 2001 Jun;78(2):367-71.

² CMAJ. 2008 Mar 11;178(6):715-22.

³ <http://www.cdc.gov/nasd/docs/d001501-d001600/d001565/d001565.html>

⁴ Environ Health Perspect. 2001 May;109 Suppl 2:191-8.

Wording To Use or Avoid

The research indicated that there are a number of words that are preferred by stakeholders and a number of words that carry negative associations. The following table should be used along with good judgment. There are no hard

and fast rules about using or not using specific words, just general guidance about tone, feel, and associations with the words.

Avoid Using ...	Instead Use ...	Why?
Surveillance	Monitoring Tracking	“Surveillance” sounds like intrusive spying. “Monitoring” or “tracking” sound more like detective work on the ground, in my community.
Comprehensive	Scalable	“Comprehensive” sounds like a big and expensive program. “Scalable” sounds like a program that can grow or decrease with the threat, allowing communities to use dollars more efficiently.
National program	Community-based	“National program” sounds like a one-size fits all program and most communities have unique needs. “Community-based” is a more locally informed approach that engages the community in creating solutions.
Mosquito-borne	Mosquito-spread	Using the word “mosquito-borne” is a bit confusing with for many audiences, when we mean diseases that are spread by mosquitoes. The spelling of the word “born(e)” is also harder on low literate audiences. “Mosquito-spread” clearly communicates that mosquitoes spread the disease.
Larvaciding	Young mosquito control or spraying	“Larvaciding” is a difficult and unfamiliar word for many people. “Young mosquito control” or “spraying” indicates that the spraying is for young (larva) and not grown mosquitoes.
Adulticiding	Adult mosquito control or spraying	“Adulticiding” is a difficult and unfamiliar word for many people. “Adult mosquito control” or “spraying” indicates that the spraying is for grown mosquitoes.

Metaphors and Social Math

Other language tools to use are metaphors and social math. Metaphors allow others to quickly understand the details a new concept or idea. For example, the metaphor of an “early warning system” for a mosquito control monitoring system evokes positive images of protection and action orientation. We provided a few metaphors below for typical mosquito control language.

Social math is another handy language tool that helps audiences quickly understand the scope and scale of

numbers that might otherwise be incomprehensible. For example, the Human Health Impact Fact Sheet states that “...short-term medical care costs of WNV will approach \$30 million in 2007...an amount that might otherwise be better used, for example, to provide health insurance to more than 25,000 children each year.” Comparing nationwide WNV health care costs to something people can relate to on a local or individual level is a good social math fact. Try to use social math whenever you are quoting large numbers or statistics.

Avoid using typical mosquito language	Instead use this metaphor
Surveillance	Early warning system
Basic Mosquito Monitoring	A banking check register A weather tracking system

Innovative Financing of Mosquito Control Programs

A number of interviewees we spoke with and documents we reviewed suggested that some communities have funded mosquito control activities through innovative financing methods. Although in areas where the risk of mosquito populations are high and where threat to local economies and human health are high, a special tax district is the most feasible long term sustainable funding mechanism. These tax districts take years to create through legislation, but are permanent fixtures in the community. When the risk and threat are not as high, innovative financing to establish a scalable program, starting with

Tier One may be the most feasible plan. The following are some of the innovative methods that have been used successfully or are suggested as good possibilities.

- ✦ Tire disposal fees
- ✦ Parks and recreation fees (campsite fees)
- ✦ Water theme park fees (high tourist areas)
- ✦ Water sports fees
- ✦ Outdoor sports gear fee

Communicating about Effective Mosquito Control

Appendix – Impact Fact Sheets

Mosquito Control Protects Health and Supports Local Economies

Human Health and Health Care Costs at Risk

Mosquito-related diseases threaten human health and are expensive to treat. These diseases can be avoided with proper action. In recent years, mosquito-spread West Nile virus (WNV) has expanded across the United States. There is now an increasing need to strengthen mosquito control programs to protect our health from WNV and other dangerous mosquito-spread diseases.

People’s health—even their lives—may be threatened by WNV, and it is financially costly as well. For example, Louisiana and South Dakota, because of their climate and terrain, rank among the top ten states for new WNV cases—increasing health care costs in the states for WNV as well as other mosquito-spread diseases.

The good news is we have many tools to manage mosquitoes, minimize human suffering and death, and reduce health care costs. Today, communities are developing locally-tailored mosquito control programs that may be scaled to adapt to changing conditions. For many areas, this means providing the basic level of protection by monitoring mosquito movement, population size, and infection rates. Just as we keep an eye on our checkbook to prevent overdrafts, or track hurricanes to avoid weather disasters, knowing how many and what kinds of mosquitoes are in your area helps communities respond more effectively when threatened.

A COMMUNITY-CENTERED APPROACH

Because regions vary in geography and climate, and because each community’s economy is supported by different industries, the need for mosquito control is a local matter. In fact, the type of mosquito control program your community needs may change over time. This means you will need a program that is tailored and flexible.

CREATE A SCALABLE PLAN READY FOR RAPID RESPONSE

Best practices in mosquito control suggest that communities consider a three-tiered approach. A scalable mosquito control program is one that may readily be increased in size and scope should an outbreak occur, or decreased when threats diminish.

- ✦ **Tier One** is a basic level of protection that helps communities monitor what type, how many, and where mosquitoes are located in your community and



encourages the community to practice preventive actions, such as managing irrigation and drainage water. These preventive actions help ensure that mosquitoes and humans have limited interaction.

Continual tracking in Tier One programs prepares communities for Tier Two, should the need arise.

- ✦ **Tier Two** programs protect communities through continued monitoring and more focused management of dangerous larvae using biological or safe chemical methods.

Should an outbreak be predicted based on experience gained in Tier Two, communities can scale up to Tier Three programs.

- ✦ **Tier Three** programs include increased use of techniques to rid the community of adult mosquitoes when disease threat indicators are high, through means such as expanded public outreach, and targeted use of safe chemicals. Programs can work closely with community leaders and environmental advocates so that all understand the elevated nature of the threat, and can help support the most effective techniques for controlling the mosquitoes and reducing the risk of human illness and death.

CONTINUED ON REVERSE

MOSQUITOES CAN AFFECT MANY STAKEHOLDERS' INTERESTS

Partners in mosquito control efforts are easy to find because mosquitoes affect many people and industries. Boards of tourism and hospitality industry business leaders are interested in protecting tourism revenue and their businesses by ensuring mosquitoes are kept in check. Ranchers, livestock farmers, and veterinary scientists share a concern for animal health and see the benefit to their industry of keeping mosquitoes under control. Public health and health care practitioners are concerned with protecting people from diseases and caring for the ill. Gardeners, golfers, youth sports groups, and other outdoor enthusiasts are more likely to engage in healthy physical activity when mosquitoes are absent. Local environmental advocates can also be important supporters and advisers to your efforts.

Including members of groups like these in dialogue is essential. Local economies may be harmed when human and animal health is at risk, or when disease outbreaks discourage tourism. Leaders in these groups make ready partners for mosquito control initiatives that cut across a community's stakeholders.

DID YOU KNOW...?

- ✦ An analysis of costs from a 2002 Louisiana outbreak showed the short-term inpatient care costs of WNV was about \$4 million. Extrapolating that across the U.S., the authors concluded that the short-term nationwide medical care costs would have been about \$61 million in 2002. This \$61 million might otherwise be better used to provide health insurance to more than 51,500 children across the U.S. each year.²
- ✦ The risk of Dengue fever, chikungunya fever and other mosquito-related diseases increases with poor mosquito control. While these diseases may sound exotic and foreign, globalization and modern day travel are making U.S. communities more vulnerable to these diseases and associated health care costs every day.

¹ West Nile virus economic impact, Louisiana (2002), Emerging Infectious Diseases (Oct, 2004) by Armineh Zohrabian, Martin I. Meltzer, Raoult Ratard, Kaafee Billah, Noelle A. Molinari, Kakoli Roy, R. Douglas Scott, II, Lyle R. Petersen.

² In 2004, the average annual premium for private health insurance for children under 18 was \$1,183. See America's Health Insurance Plans, "Individual Health Insurance: A Comprehensive Survey of Affordability, Access, and Benefits," p. 5, www.ahipresearch.org/pdfs/Individual_Insurance_Survey_Report8-26-2005.pdf (August 2005).

START TODAY!

When not monitored and controlled, dangerous mosquito outbreaks can cause illness and cost lives, threaten livestock industries, dampen tourism, and discourage active living. That's why it is important to get started now on a mosquito control program for your area.

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- 2) **Ask others what they think.** Discuss what you've learned about mosquito control with colleagues and leaders in public health, veterinary medicine, tourism, environmentalism, outdoor living, emergency preparedness, and public policy to gather expertise and assess resources.
- 3) **Develop a local coalition and a champion.** Build on the relationships developed while gathering information and identify motivated stakeholders who can help drive mosquito control policy improvement. Look for a champion who will take the lead.
- 4) **Develop a program that is tailored to local needs.** Conduct an assessment with your team to determine what kind or level of mosquito control program makes the most sense for your state or area. Because the mosquito threat is different in every region, you will want a program adapted to meet local needs and resources.

STRATEGIC INVESTMENTS IN MOSQUITO CONTROL SAVE LIVES AND DOLLARS

For more information and resources, please visit the Association of State and Territorial Health Officials Web site, www.astho.org, or the Centers of Disease Control Division of Vector-borne Infectious Disease Web site, www.cdc.gov/ncidod/dvbid/westnile/index.htm.



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Mosquito Control Protects Animal Health, Supports Agriculture

Rural Economies at Risk from Disease Outbreaks

Mosquito-related diseases threaten animal health and are expensive to treat. These diseases can be avoided with proper action. For example, the health of horses and the equine industry are at risk from mosquito-spread illnesses including West Nile virus (WNV), the equine encephalitis virus. In this age of global trade and travel, even a foreign disease like Rift Valley Fever (RVF) could potentially jump to the United States and rapidly affect states like Texas, Colorado, or Missouri—states where the horse industry is an important economic force and where incidence of WNV is above average. Stronger mosquito control programs are needed to protect animal health and human health in these states and many others.

The good news is we have many tools to manage mosquitoes, protect animal health, avoid needless illness, and reduce veterinary costs. Today, communities are developing locally-tailored mosquito control programs that may be scaled to adapt to changing conditions. For many areas, this means providing the basic level of protection by monitoring mosquito movement, population size, and infection rates. Just as we keep an eye on our checkbook to prevent overdrafts, or track hurricanes to avoid weather disasters, knowing how many and what kinds of mosquitoes are in your area helps communities respond more effectively when threatened.

A COMMUNITY-CENTERED APPROACH

Because regions vary in geography and climate, and because each community's economy is supported by different industries, the need for mosquito control is a local matter. In fact, the type of mosquito control program your community needs may change over time. This means you will need a program that is tailored and flexible.

CREATE A SCALABLE PLAN READY FOR RAPID RESPONSE

Best practices in mosquito control suggest that communities consider a three-tiered approach. A scalable mosquito control program is one that may readily be increased in size and scope should an outbreak occur, or decreased when threats diminish.

- ▮ **Tier One** is a basic level of protection that helps communities monitor what type, how many, and where mosquitoes are located in your community and



encourages the community to practice preventive actions, such as managing irrigation and drainage water. These preventive actions help ensure that mosquitoes and animals have limited interaction.

Continual tracking in Tier One programs prepares communities for Tier Two, should the need arise.

- ▮ **Tier Two** programs protect communities through continued monitoring and more focused management of dangerous larvae using biological or safe chemical methods.

Should an outbreak be predicted based on experience gained in Tier Two, communities can scale up to Tier Three programs.

- ▮ **Tier Three** programs include increased use of techniques to rid the community of adult mosquitoes when disease threat indicators are high, through means such as expanded public outreach, and targeted use of safe chemicals. Programs can work closely with community leaders and environmental advocates so that all understand the elevated nature of the threat, and can help support the most effective techniques for controlling the mosquitoes and reducing the risk of animal illness and death.

CONTINUED ON REVERSE

MOSQUITOES CAN AFFECT MANY STAKEHOLDERS' INTERESTS

Partners in mosquito control efforts are easy to find because mosquitoes affect many people and industries. Ranchers, livestock farmers, and veterinary scientists share a concern for animal health and see the benefit to their industry of keeping mosquitoes under control; the Cooperative Extension Service in your state may be a source for new partners with an interest in animal health. Gardeners, golfers, youth sports groups, and other outdoor enthusiasts are more likely to engage in healthy physical activity when mosquitoes are absent. Boards of tourism and hospitality industry business leaders are interested in protecting tourism revenue and their businesses by ensuring mosquitoes are kept in check. Public health and health care practitioners are concerned with protecting people from diseases and caring for the ill. Local environmental advocates can also be important supporters and advisers to your efforts.

Including members of groups like these in dialogue is essential. Local economies may be harmed when animal and human health is at risk, or when disease outbreaks discourage tourism. Leaders in these groups make ready partners for mosquito control initiatives that cut across a community's stakeholders.

DID YOU KNOW...?

- ✦ There is no treatment for West Nile virus (WNV) once a horse becomes infected. About one out of every three horses that become ill will not survive.¹
- ✦ The economic costs of WNV in Texas can be estimated at \$2,300 per horse.²
- ✦ A 2002 study in Nebraska and Colorado showed that the costs of WNV on the horse industry alone was over \$1.2 million in those states.²
- ✦ The horse industry contributes approximately \$39 billion in direct economic impacts to the U.S., \$5.2 billion to the Texas economy, \$1.6 billion to the Colorado economy, and \$1.3 billion to the Missouri economy.³

¹ United States Department of Agriculture, http://www.aphis.usda.gov/vs/nahss/equine/wnv/2007_equine_west_nile_virus_final.pdf (2007).

² *Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries*, http://www.aphis.usda.gov/vs/ceah/ncahs/nahms/equine/wnv2002_CO_NB.pdf (2002).

³ *American Horse Council 2005 Survey*, <http://horsecouncil.org/economics.html> (2005).

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Mosquito Control Encourages Active Outdoor Lifestyles

Healthy Living and Jobs May Be Threatened

Health experts encourage outdoor activity, such as biking, walking, gardening, and golf, as an important part of a healthy lifestyle. Activities like this are growing in popularity especially as people are trying to address childhood and adult obesity. But outdoor activities are threatened when people fear exposure to mosquitoes that may spread illnesses. While mosquitoes are certainly a nuisance for outdoor enthusiasts, more worrisome are the health risks and health care costs associated with the spread of West Nile virus (WNV), encephalitis, and other diseases that may be carried by mosquitoes.

Outdoor sports and leisure activities contribute significantly to local economies in nearly every corner of the country, including Montana and Nebraska. Effective mosquito control planning is vital for protecting local economies, and for preventing costly diseases that threaten human and animal health.

The good news is we have many tools to manage mosquitoes, protect people and communities, and avoid harmful and expensive illnesses. Today, communities are developing locally-tailored mosquito control programs that may be scaled to adapt to changing conditions. For many areas, this means providing the basic level of protection by monitoring mosquito movement, population size, and infection rates. Just as we keep an eye on our checkbook to prevent overdrafts, or track hurricanes to avoid weather disasters, knowing how many and what kinds of mosquitoes are in your area helps communities respond more effectively when threatened.

A COMMUNITY-CENTERED APPROACH

Because regions vary in geography and climate, and because each community's economy is supported by different industries, the need for mosquito control is a local matter. In fact, the type of mosquito control program your community needs may change over time. This means you will need a program that is tailored and flexible.

CREATE A SCALABLE PLAN READY FOR RAPID RESPONSE

Best practices in mosquito control suggest that communities consider a three-tiered approach. A scalable mosquito control program is one that may readily be increased in size and scope should an outbreak occur, or decreased when threats diminish.



- **Tier One** is a basic level of protection that helps communities monitor what type, how many, and where mosquitoes are located in your community and encourages the community to practice preventive actions, such as managing irrigation and drainage water. These preventive actions help ensure that mosquitoes and people have limited interaction.

Continual tracking in Tier One programs prepares communities for Tier Two, should the need arise.

- **Tier Two** programs protect communities through continued monitoring and more focused management of dangerous larvae using biological or safe chemical methods.

Should an outbreak be predicted based on experience gained in Tier Two, communities can scale up to Tier Three programs.

- **Tier Three** programs include increased use of techniques to rid the community of adult mosquitoes when disease threat indicators are high, through means such as expanded public outreach, and targeted use of safe chemicals. Programs can work closely with community leaders and environmental advocates so that all understand the elevated nature of the threat, and can help support the most effective techniques for controlling the mosquitoes and reducing the risk of human illness and death.

CONTINUED ON REVERSE

MOSQUITOES CAN AFFECT MANY STAKEHOLDERS' INTERESTS

Partners in mosquito control efforts are easy to find because mosquitoes affect many people and industries. Biking or walking clubs, gardening associations, and sports leagues—as well as the businesses that support them—all may share an interest in mosquito control. Public health and health care practitioners are concerned with promoting health, protecting people from diseases and caring for the ill. Boards of tourism and hospitality industry business leaders are interested in protecting tourism revenue and their businesses by ensuring mosquitoes are kept in check. Ranchers, livestock farmers, and veterinary scientists share a concern for animal health and see the benefit to their industry of keeping mosquitoes under control. Local environmental advocates can also be important supporters and advisers to your efforts.

Including members of groups like these in dialogue is essential. Local economies may be harmed when human and animal health is at risk, or when disease outbreaks discourage tourism. Leaders in these groups make ready partners for mosquito control initiatives that cut across a community's stakeholders.

DID YOU KNOW...?

- ✦ 50 million mountain bikers pump \$26 billion into the American economy annually— more than 1 1/2 times the actual total discretionary budget authority for NASA.¹
- ✦ More than 60,000 jobs across Mountain States region are associated with bicycling.¹
- ✦ An analysis of costs from a 2002 Louisiana outbreak showed the short-term inpatient care costs of WNV was about \$4 million. Extrapolating that across the U.S., the authors concluded that the short-term nationwide medical care costs would have been about \$61 million in 2002.²
- ✦ Bike Ride Across Nebraska is an example of one bike ride event that attracts recreation dollars. Riders spend an average of \$10,000 to \$16,000 per event in each overnight town.³

¹International Mountain Biking Association, http://www.imba.com/resources/science/shimano_econ_impacts.pdf

²West Nile virus economic impact, Louisiana, 2002, Emerging Infectious Diseases (Oct, 2004) by Armineh Zohrabian, Martin I. Meltzer, Raoult Ratard, Kaafee Billah, Noelle A. Molinari, Kakoli Roy, R. Douglas Scott, II, Lyle R. Petersen.

³<http://www.bran-inc.org/about.shtml>

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Tourism Supported Through Better Mosquito Control

Hospitality at Risk from Mosquito-spread Disease

A vibrant travel and hospitality economy depends on the good will of tourists and their enjoyment of camping, parks, and other outdoor activities. Mosquitoes and the potential diseases they spread not only get in the way of positive outdoor experiences for travelers, but they threaten human health and are expensive to treat.

Nuisance mosquitoes may discourage travelers from returning. However, when visitors are frightened about mosquito-spread illnesses, such as West Nile virus or encephalitis, they may never make the trip at all. And in today's Internet world, a mosquito-riddled trip for one family can end up being broadcast around the world through popular travel Web sites in seconds. That's why stronger mosquito control programs can help protect states like Wyoming and North Dakota where tourism is an important part of their economies.

The good news is we have many tools to manage mosquitoes, protect a vibrant tourism economy, make travel more relaxing, and avoid harmful and expensive illnesses. Today, communities are developing locally-tailored mosquito control programs that may be scaled to adapt to changing conditions. For many areas, this means providing the basic level of protection by monitoring mosquito movement, population size, and infection rates. Just as we keep an eye on our checkbook to prevent overdrafts, or track hurricanes to avoid weather disasters, knowing how many and what kinds of mosquitoes are in your area helps communities respond more effectively when threatened.

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CONTINUED ON REVERSE

MOSQUITOES CAN AFFECT MANY STAKEHOLDERS' INTERESTS

Partners in mosquito control efforts are easy to find because mosquitoes affect many people and industries. For example, boards of tourism and hospitality industry business leaders are interested in protecting tourism revenue and their businesses by ensuring mosquitoes are kept in check. Public health and health care practitioners are concerned with protecting people from diseases and caring for the ill. Gardeners, golfers, youth sports groups, and other outdoor enthusiasts are more likely to engage in healthy physical activity when mosquitoes are absent. Ranchers, livestock farmers, and veterinary scientists share a concern for animal health and see the benefit to their industry of keeping mosquitoes under control. Local environmental advocates can also be important supporters and advisers to your efforts.

Including members of groups like these in dialogue is essential. Local economies may be harmed when human health and comfort are at risk, or when disease outbreaks discourage tourism. Leaders in these groups make ready partners for mosquito control initiatives that cut across a community's stakeholders.

DID YOU KNOW...?

- ✦ Tourism accounts for 8.3% of Wyoming's total state sales tax revenue and 29,950 full time and part time jobs.¹
- ✦ If not for the contribution of the tourism industry, every household in Wyoming would pay \$510 in additional taxes per year.¹
- ✦ Tourism accounts for nearly 20% of North Dakota's economic base.²
- ✦ Across the United States, out-of-area U.S. park visitors spent \$9.4 billion in the local regions surrounding surveyed parks in FY 2005.³

¹ http://www.wyomingbusiness.org/pdf/tourism/2006_Impact_Report.pdf

² *Estimating North Dakota's Economic Base*, <https://www.ndtourism.com/uploads/resources/554/nd-econbase90-06.pdf>

³ <http://web4.canr.msu.edu/mgm2>

START TODAY!

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Mosquito Control Vital Before and After Natural Disasters

As Flood Waters Rise, So Do Mosquito Populations

Floods, hurricanes and other water-related disasters cost lives and devastate communities in states like Mississippi and Louisiana. In the days and weeks following such storms, a serious threat to human health and local economies can build quietly as the number of mosquitoes, and the diseases they may spread, increases. That's why an effective emergency response plan includes mosquito monitoring and control.

After a flood, mosquitoes may be more abundant than usual. The filth and debris left by flood waters create excellent breeding conditions for mosquitoes. Some mosquitoes may carry and spread serious illnesses, including West Nile virus (WNV) and encephalitis, and these diseases are dangerous to human and animal health. Good mosquito control planning before and prompt action after a disaster can help a community recover from flooding more quickly.

The good news is we have many tools to manage mosquitoes, protect people and communities before and following natural disasters, and avoid harmful and expensive illnesses. Today, communities are developing locally-tailored mosquito control programs that may be scaled to adapt to changing conditions. For many areas, this means providing the basic level of protection by monitoring mosquito movement, population size, and infection rates. Just as we keep an eye on our checkbook to prevent overdrafts, or track hurricanes to avoid weather disasters, knowing how many and what kinds of mosquitoes are in your area helps communities respond more effectively when threatened, especially in the aftermath of flooding and clean-up activities.

A COMMUNITY-CENTERED APPROACH

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CREATE A SCALABLE PLAN READY FOR RAPID RESPONSE

Best practices in mosquito control suggest that communities consider a three-tiered approach. A scalable mosquito control program is one that may readily be increased in size and scope should an outbreak occur, or decreased when threats diminish.



© 2008 Photo Courtesy of the American Red Cross

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CONTINUED ON REVERSE

MOSQUITOES CAN AFFECT MANY STAKEHOLDERS' INTERESTS

Partners in mosquito control efforts are easy to find because mosquitoes affect many people and industries. For example, the Federal Emergency Management Agency (FEMA), the Red Cross, and other organizations that respond to disasters are natural partners. Public health and health care practitioners are concerned with protecting people from diseases and caring for the ill. Boards of tourism and hospitality industry business leaders are interested in protecting tourism revenue and their businesses by ensuring mosquitoes are kept in check. Gardeners, golfers, youth sports groups, and other outdoor enthusiasts are more likely to engage in healthy physical activity when mosquitoes are absent. Ranchers, livestock farmers, and veterinary scientists share a concern for animal health and see the benefit to their industry of keeping mosquitoes under control. Local environmental advocates can also be important supporters and advisers to your efforts.

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DID YOU KNOW...?

- After Hurricane Katrina struck Louisiana and Mississippi in 2005, the number of reported cases of a specific West Nile disease sharply increased in hurricane-affected regions, impacting health care costs for both states at an already difficult time.¹
- Residents in states surrounding flood-stricken regions may also be at risk when mosquitoes carrying disease spread over a larger area.
- In the summer of 2008, following widespread spring flooding in the Upper Midwest, there were 20 times the normal number of mosquitoes in Iowa, and in Chicago there were up to five times more than usual.²

¹ *Emerging Infectious Disease*, May 2008.

² *Associated Press*, July 3, 2008.

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