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A Controversial Bill (H.R. 897) To Mosquito Control Programs: A Policy Analysis

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CAPSTONE PROJECT PAPER

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Abstract

The primary purpose of this paper was to analyze the legal, financial, and administrative burdens of the Pesticides General Permit on mosquito control programs from a policy perspective. Mosquito control is often highly controversial, particularly when it involves the use of pesticides that have their own potentially serious health and environmental impacts. In 2009, the Environment Protection Agency issued the permit to be obtained by pesticide applicators before pesticides could be discharged into waterways in addition to existing Federal Insecticides, Fungicides, and Rodenticides Act (FIFRA) regulations. Some provisions of the permit could impact mosquito control activities. Therefore, in response to that new regulatory layer a bill (H.R. 897) was proposed as a policy solution to repeal the regulation requirements so that mosquito control programs would apply mosquito pesticides under FIFRA regulations only. The change is backed by mosquito control professionals and pesticides industry interest groups but objected to by environmental activists.

Even though the bill has a bipartisan support in both the House and the Senate, it has yet to become a law. So far, since the implementation of the permit regulations, no state or local mosquito control pesticide applicator has complained of any barriers limiting its activities and none have been subjected to a legal action. Moreover, the regulation has been implemented seamlessly across the country. As a result, our policy analysis didn't support the repeal of the Pesticides General Permit as requested by mosquito control professionals. The principal contribution of this policy analysis is to advocate for effective, efficient, and environmentally sound mosquito control practices that will help minimize or eliminate the discharge of pesticides into waters of the United States.

Keywords: Mosquito control, pesticides regulations, IVM, FIFRA, PGP, H.R. 897.

Contents

List of Abbreviations

AMCA…………………………..American Mosquito Control Association

APHA…………………………….American Public Health Association

ASTHO…………………………Association of State and Territorial Health Officials

NACCHO………………………National Association of City and County Health Officials

CDC……………………………..Centers for Disease Control and Prevention

CWA……………………………Clean Water Act

DDT…………………………….DichloroDiphenylTrichloroethane

DEET……………………………N,N-diethyl-meta-toluamide

DHHS…………………………..Department of Health and Human Services

EPA……………………………..Environmental Protection Agency

FEMA…………………………..Federal Emergency Management Agency

FIFRA……………………………Federal Insecticides, Fungicides, and Rodenticides Act

FQPA……………………………Food Quality Protection Act

HR……………………………….House of Representative

IPM……………………………..Integrated Pest Management

MCP…………………………….Mosquito Control Program

MVCA…………………………..Mosquito and Vector Control Association

NAVCO…………………………National Association of Vector-Borne Disease Control Officials

NIH………………………………National Institute of Health

NOI………………………………Notice of Intention

NPDES…………………………..National Pollutant Discharge Elimination System

PGP……………………………….Pesticides General Permit

PHPMS…………………………..Public Health Pest Management Section

USDA……………………………..United States Department of Agriculture

USGS……………………………..United States Geographical Survey

UVL……………………………….Ultra-Low Volume

WHO……………………………..World Health Organization

WNV……………………………..West Nile Virus

I. Introduction

In the United States, mosquito control programs (MCPs) control mosquito nuisance and mosquitoes that transmit disease to people, such as West Nile, Chikungunya, yellow fever, dengue and Zika. Some diseases are treatable and there is an effective vaccine against yellow fever. But other potentially mosquito-borne infections, such as West Nile, dengue, and Zika viruses cannot be prevented with a vaccine or cured with medicines. So, public health officials focus instead on controlling mosquito populations. They use a variety of cutting-down approaches on mosquito species with pesticide applications as the main approach to combat mosquito populations. For nearly 40 years, the Environment Protection Agency allowed MCPs and other pesticides applicators to discharge pesticides into waters without a Clean Water Act (CWA) permit and instead relied on the Federal Insecticides, Fungicides, and Rodenticides Act (FIFRA) regulation process to regulate such pesticides use. The primary objective of this paper was to analyze different policy options that could mitigate or eliminate mosquito nuisance and the risk of mosquito-borne diseases without relying on widespread pesticide applications.

II. Background

Mosquito control is an important and basic public health function. The rapid spread of West Nile virus across the United States in the last decade and the ongoing outbreak of Zika virus demonstrate the continuing need for organized mosquito control activities. States and local communities are challenged to maintain and develop these essential vector control programs, especially in tight budgetary times and when emergency situations arise. Understanding the determinants of these challenges and the context in which the health policy issue emerges will subsequently form the basis of the health policy analysis. Three themes that emerge are: (1) burden of mosquito and mosquito-borne diseases; (2) mosquito control programs; and (3) the concept of integrated vector management.

II.1. Burden of mosquito and mosquito-borne diseases

Mosquitoes can cause a great deal of human suffering. Mosquito-transmitted diseases are among the leading causes of morbidity and mortality worldwide (AMCA, 2011). The World Health Organization estimates that more than 300 million clinical cases each year are attributable to mosquito-borne illnesses (Lambrechts, 2009). Over one million people worldwide die every year from mosquito-borne diseases (Lambrechts, 2009). Epidemics of mosquito-transmitted diseases were once to be common in the United States. Malaria, yellow fever, dengue fever and Chikungunya virus outbreaks were once common in America but have been successfully eliminated through widespread public efforts (Dickinson, 2012). With the elimination of many deadly mosquito-borne diseases, control efforts are now mainly focused on pest mosquitoes rather than disease vectors (LaBeaud, 2010). Despite great efforts over the last six decades, mosquito-borne illnesses continue to pose significant risks to certain populations. Current challenges posed by the reemergence of West Nile virus in the

United States and emergence of Zika virus illustrate the importance of collaboration at all levels of government to protect public health against such emerging threats. Certain cases of mosquito-borne diseases such as West Nile virus, dengue fever, and encephalitis viruses often progress to complications such as encephalitis or hemorrhagic fever, which result in severe long-term physical and cognitive impairment, or in early death (Goddard, 2008). According to the CDC, over 27,000 cases of encephalitis viruses occurred in the U.S. from 2004-2014 (see Fig 1), almost 16,000 cases of neuro-invasive disease causing permanent disability and over 1,500 fatalities. Moreover, numerous West Nile virus cases may not be counted because of significant underreporting of milder cases of WNV fever (Morens, 2004). As of March 2016, the CDC has reported more than 258 Zika virus locally acquired cases in US Territories and more than 283 travel-associated Zika virus disease cases in US States.

Impacts of mosquito annoyance and emergence and reemergence of mosquito-borne diseases in many parts of the United States could result to extensive health care costs and productivity loss, (Tomerini, 2011) such as:

- An increased impact on humans, domestic animals and wildlife such as large birds, and zoo species. People and animals are particularly susceptible to West Nile virus and other types of mosquito-borne diseases such as eastern equine encephalitis and St. Louis encephalitis (Goddard, 2003),
- A lower quality of life due to annoyance caused by a great number of mosquitoes in the neighborhoods,

- Devastating economic problems and negative impact on local economies; many outdoor recreational and work activities may be ruined by the constant annoyance and irritation caused by their nasty bites, and
- A decrease in property values caused by an abundance of mosquitoes in infested areas.

While public health professionals may focus on reducing the risk of disease transmission, the public at large might be more interested in the reduction in nuisance or annoyance that mosquitoes inflict on people (Dickinson, 2012). For any reason, mosquito control underscores the need for a sound and well-funded mosquito control policies and actions (Dickinson, 2012). The best defense against mosquito-borne diseases is strong local mosquito control programs.

II.2. Mosquito control programs

In 2011, there were at least 734 organized mosquito control districts conducting mosquito control activities in the United States and at least 1105 small municipal mosquito control agencies, mostly in rural areas with annual budget that can run from as little as $500 to as much as $24 million (Conlon, 2011). A variety of agencies from the global (e.g., World Health Organization) and federal (e.g., U.S. Environmental Protection Agency, Centers for Disease Control and Prevention, and National Institutes of Health) levels support mosquito control research (Del Rosario, 2014). State agencies worked in close collaboration with the American Mosquito Control Association (AMCA) and State Mosquito and Vector Control Association (MVCA) to meet the needs of communities, stakeholders and public officials. Mosquito control personnel respond to citizen complaints, conduct public education, mosquito and mosquito-borne diseases surveillance, and mosquito control activities (Vazquez-Prokopec, 2010). Various control measures are available and are utilized depending on state and local mosquito control policy. The participation of communities or counties is voluntary (Tedesco, 2010).

Many mosquito control programs have limited resources. Funding for these surveillance and control activities comes from a variety of sources, e.g., special county/municipal tax levies, property assessments, distributions of state taxes and federal grants (Conlon, 2011). Funding is continuously declining resulting to understaffed and reduced functionality of many state and community-level mosquito surveillance and control programs (Vazquez-Prokopec, 2010). In 2007, a survey conducted at the Public Health Vector Control Conference by the Association of State and Territorial Health Officials (ASTHO, 2008) found that: 74% did not have sufficient numbers of public health workers to effectively staff their vector control units; 38% said inadequate funding was the most challenging aspect for state vector control activities; 80% stated that their agencies had not taken any action to prepare for the effect of climate change on vector-borne disease; and several states reported that they had no ability to conduct vector surveillance of any kind.

In 2013, "*the state of Kentucky spent its entire annual mosquito-control budget in one night, about $2 million, to treat about 10 percent of the state area when the state had to cope with massive mosquito blooms caused by flooding and changing in water* *control*," said Grayson Brown, director of the University of Kentucky's Public Health entomology laboratory and former president of the Entomological Society of America.

The aim of mosquito control is to limit the impact of mosquito nuisance and disease on US residents, while simultaneously maintaining and improving the environment. Since the advent of DDT (dichlorodiphenyltrichloroethane) and other organochlorine insecticides in the 1940s, vector control has depended largely on the action of chemical insecticides to kill vectors and prevent transmission of disease pathogens to humans (Gratz, 1994). Mosquito control is too often in the middle of a conflict between citizens who may feel that mosquito control is insufficient and those people who believe mosquito control is harming the environment and public health (Thier, 2001). Mosquito control activities are important to the public health, and responsibility for carrying out these programs rests with state and local governments (Ginsberg, 2001). The federal government assists states in emergencies and provides resources, training and consultation in mosquito and mosquito-borne disease problems when requested by the states after a natural disaster (FEMA, 2012).

To address these challenges, the Centers for Disease Control and Prevention (CDC) has proposed a nationwide concept of Integrated Vector Management (IVM), which once applied to MCPs, aims to be a rational decision-making process for the optimal use of resources in the management of mosquito populations, so as to reduce or stop the transmission of mosquito-borne diseases (Ginsberg, 2001).

II. 3. Concept of Integrated Vector Management

Integrated Vector Management (IVM) is a concept used to describe vector management practices that provide effective vector control, while reducing or eliminating pesticide use. IVM is an effective and environmentally sensitive approach to vector management that relies on a combination of sound practices (EPA, 2012). EPA and CDC encourage maximum adherence to IVM. Ideally, an IVM program considers all available control actions, including no action, and evaluates the interaction among various control practices, cultural practices, weather, and habitat structure (CDC, 2013). IVM for mosquito control uses pesticides, but only after systematic monitoring of mosquito populations indicates a need (Del Rosario, 2014). Sustained integrated mosquito management requires alternative use of different classes of insecticides, in conjunction with resistance monitoring, source reduction, biological control, and public education.

The IVM approach thus uses a combination of resource management techniques to control mosquito populations with decisions based on surveillance data (Diana, 2014). The underlying philosophy of mosquito control is based on the fact that the greatest control impact on mosquito populations will occur when they are concentrated, immobile and accessible (EPA, 2012). This emphasis focuses on habitat management and controlling the immature stages before the mosquitoes emerge as adults (CDC, 2013). This policy reduces the need for widespread pesticides application in urban areas (Del Rosario, 2014). EPA and CDC recommend that professional mosquito control organizations throughout the United States continue to use IVM strategies (CDC, 2013). Both federal agencies recognize a legitimate and compelling need for the cautious use of pesticides, under certain circumstances, to control larvae and adult mosquitoes. This is especially true during periods of mosquito-borne disease transmission or when source reduction and larval control have failed or are not feasible (EPA, 2012).

In fall 2000, the American Public Health Association (APHA) passed a resolution, "*Maximizing Public Health Protection with Integrated Vector Control*." The resolution recommends guidelines for disease prevention, including surveillance and risk communication, increased federal funding to the CDC, and the minimization of unnecessary use of pesticides in vector management (see APHA resolution in Appendix C). IVM programs must be proactive and make plans in advance to address increasing levels of nuisance and vector mosquitoes within the communities (CDC, 2013). Many mosquito surveillance programs use a variety of approaches such as geographic information systems, topographic mapping, mosquito trapping, landing and biting counts, seasonal weather data, and citizen complaints about mosquito abundance to identify highly mosquito-infested areas (Rose, 2001; Del Rosario, 2014). A sustainable IVM for public health control of mosquitoes includes five components (CDC, 2013):

- *Surveillance/monitoring,*
- *Identification of mosquito species,*
- *Establishment of threshold levels,*
- *Implementation of two or more control measures;* when evidence of nuisance or

disease vector mosquito species is detected and confirmed by surveillance and epidemiologic data (Goddard, 2008), control measures are taken to reduce mosquito numbers to a point below the threshold level to protect public health and comfort. These measures consist of:

- **Source reduction***;* it starts with the elimination of mosquito breeding sites (Tedesco, 2010). It also controls irrigation water in agricultural areas to avoid excess of runoff; thus, provides an important control of mosquitoes at their source (Connelly, 2009). But the latter measure has been suspended in many states because it impacts some endangered species (Milam, 2000).
- **Larviciding**; it is one of the most common methods of mosquito control used today and the second best control option after source reduction. FIFRA-approved chemicals are applied to control larvae in breeding sites (Kelly, 2011). Many factors have to be considered before applying larvicides in standing waters. These factors include the mosquito species, larval density, stage of development, relative proximity to populate areas, size of the area, seasonality, susceptibility, equipment and larvicides selected by the program, the larvicide formulation, environmental issues, jurisdiction, rain and wind conditions, and cost (Goddard, 2003). Larviciding is effective, but costly, in terms of money and labor and a comprehensive larvicide program is beyond the scope of current MCPs' resources (Herring, 2010).
- **Adulticiding** should only be used when necessary and be done after sunset (Goddard, 2003). A complete list of FIFRA-approved insecticides, mixing

rates, and application rates are provided by MCPs (Brow, 1997). Application of mosquito pesticides may be dispersed from truck-mounted, ultralow volume (ULV), or aerosol generators. Aerial spraying by aircraft for adult mosquito control can also be conducted when there are a large number of mosquitoes (Bohan, 2000). While this technique has proven to be an effective mosquito population-level reduction technique (Harrison, 2008), it exposes the public to chemical residue and promotes the buildup of mosquito populations resistant to chemicals (Goddard, 2003).

- **Biological control**; animals like birds, bats, dragonflies and frogs have been used by many mosquito control agencies (Lambrechts, 2009). Other biological control means include invertebrate predators and parasites to control mosquito eggs and larvae in standing waters. The use of fish is particularly effective in controlling the aquatic stages of the mosquito (Connelly, 2009). However, there is no documented study to show that mosquito predators consume enough adult mosquitoes to be effective control agents (Goddard, 2003). Innovative technology using genetically modified mosquito to suppress the pathogen transmission or kill the mosquito after eclosion is underway and promise an environmental-friendly approach to be used in combination to existing methods (Lambrechts, 2009).
- **Public education and relations**; it starts with the cleanup of artificial containers (old tires, buckets, cans and any other water holding containers)

that can greatly reduce mosquito breeding sites in a community, particularly in areas with few natural wetlands (Bohan, 2000). Mosquitoes can be kept out of the home by keeping windows, doors, and porches tightly sealed and insect screens in good shape. Personal protection from bites is the first line of defense against mosquito nuisance and infection. The CDC stated that "*the only way to prevent mosquito from biting could be accomplished by effective personal protection behaviors and practices, such as mosquito-avoidance, use of personal repellents, and removal of residential mosquito sources*" (CDC, 2013). In addition to presentations to adult groups, organizations, business, homeowners and neighborhood associations, some state's MCPs have developed mosquito control education and information programs for school children from third grade through high school.

- *Measurement and evaluation.*

III. Scope of the problem

In addition to the declining funding for MCPs' activities, since 2011 MCPs have become subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) Pesticides General Permit. This action was in response to a 2009 decision by the United States. Sixth Circuit Court of Appeals in National Cotton Council, et al. v. EPA, which found that point source discharges of biological pesticides and chemical pesticides that leave a residue into waters are pollutants under the Clean Water Act (EPA, 2012). The underlying intent of the PGP is to enforce the use of

Integrated Vector Management measures and therefore to limit the discharge of pesticides into surface waters in the US (EPA, 2012). Public health mosquito control activities could be adversely impacted by some provision of the new CWA regulations. As of 2015, 46 states have been delegated authority to administer the permit program; EPA issues discharge permits in the remaining states.

III.1. Regulations of pesticides under FIFRA

The principal controlling law is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) administered by the EPA. The Congress passed the FIFRA in 1974 (EPA, 2012). The FIFRA regulates the registration, labeling, and sales of pesticides in the United States. Under this law, a pesticide manufacturer must apply to EPA to have its product registered, at which point the pesticide can be sold and distributed in the United States. As part of the application, the manufacturer must submit to EPA results from toxicity and other tests to show that, in general, the pesticide will not cause unreasonable adverse effects on environment when used according to the label. When the EPA decides whether or not to register a pesticide; it will consider the data submitted by the manufacturer and take into consideration the potential health and environmental impacts. The end product is a labeling on the product that sets forth the way the pesticide can be legally used. The label is the law (EPA, 2012).

III.2. Provisions of the CWA Pesticide General Permit

The EPA issued a Pesticides General Permit for point source discharges from the application of pesticides to waters of the United States. The provisions of the PGP concern all types of activities that discharge chemical and biological pesticides that leave residue in waterways. Any mosquito control pesticide application activity that can result in a point source discharge into US waters must now be covered by a PGP in addition to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) certification requirements. This includes any spraying that may occur during emergency or disaster situations (EPA, 2012). Pesticides applicators should now comply by the following requirements:

- Applicators must submit a Notice of Intention (NOI) prior to conducting any spraying operations; however the NOI may be completed 30 days after an event if there is a public health emergency.
- Applicators are also required to document what pesticide was used, what quantity, and which locations were sprayed during each event.
- Annual reports summarizing the pesticide use must also be submitted to the EPA.
- If any endangered species are present in the affected waters, additional consultation must be sought to ensure the endangered species will not be adversely affected (EPA, 2012).

A general permit, as opposed to an individual permit, applies to multiple dischargers located together in a geographic area or with a common type of discharge. Rather than having each individual discharger obtain a permit, a general permit makes it easier to apply for a permit prior to applying pesticides on a given water body. The EPA general pesticide permit requires pesticide applicators to analyze safer alternatives to pesticide use, to monitor for environmental impacts post-application, and to ensure public safety and create consistency for the regulated community (CDC, 2013). The permit covers activities in which pesticide discharges into waters leave a residue and when the pesticide application is for one of the following pesticide use patterns (Goddard, 2001):

- Mosquito and other flying insect pest control,
- Aquatic weed and algae control,
- Aquatic nuisance animal control, and
- Forest canopy pest control.

EPA's own analysis suggests that the NPDES permits program for pesticides is the single greatest expansion of the program in its history, covering over five and half million pesticides applications per year by at least 365,000 applicators, including state agencies, city and county municipalities, mosquito control districts, water districts, pesticide applicators, farmers, ranchers, forest managers, scientists and many others (EPA, 2012).

III.3. Concerns over the impact of PGP on the future of mosquito control

The failure to obtain and conform to such a permit can subject MCPs to costly litigation through the citizen lawsuit provisions of the CWA (AMCA, 2011) as well as from environmental groups and the EPA. The extent to which mosquito control programs, both large and small, have reduced operations because of administrative costs and fears of potentially ruinous litigation related to compliance with new Clean

Water Act requirements mandated by the courts are not yet fully investigated. According to AMCA officials, the National Pollutant Discharge Elimination System compliance costs are forcing programs to redirect control resources to comply with the regulatory requirements (AMCA, 2012). As of November 27, 2012, 48 states reported West Nile virus infections in people, birds, horses or mosquitoes (CDC, 2010). According to the CDC, a total of 5,245 human West Nile cases, including 236 deaths, have been reported in the US. A particular interest is the notion that the NPDES permit requirements may have in some way contributed to the WNV outbreak because of chilling effects they may have had on the conduct of mosquito control operations (AMCA, 2013).

In some states, preventive mosquito control strategies such as comprehensive Integrated Mosquito Management practices are being curtailed in order to redirect resources toward increased administrative and water monitoring costs (AMCA, 2011). This effectively pushes mosquito control districts toward more extensive spraying of adulticides to provide the same measure of control. Commercial applicators historically serving rural communities and small municipalities are increasingly opting to cancel their programs out of fear of increased liability under the CWA (AMCA, 2011). Liability fears are fueling pressures to forego consideration of preventive adulticiding until human cases are identified, allowing for transmission to take place while diseases are incubating in the human population.

Water monitoring costs now being levied on California and New York mosquito control districts, if applicable nationwide, would close many districts in other states. In the absence of a non-emergency public health exception to NPDES, there will eventually be increased pressure for other states to adopt California's monitoring policies.

IV. Proposed policy

To undo the court ruling and nullify the EPA general permit requirement, the American Mosquito Control Association (AMCA), a scientific/educational, not-for-profit public service association believed that it would take an act of Congress to legislatively clarify the distinction between public health pesticides and other chemical pollutants to allow mosquito control programs to deliver vital public health services, in a manner free from citizen lawsuits challenging the use of FIFRA-registered pesticides, and free from excessive regulatory burdens and costs (AMCA, 2010). A bill (H.R.872) coined as the "*Reducing Regulatory Burdens Act*" was first introduced by Rep. Bob Gibbs (R-Ohio), author of the bill in March 2, 2011 during the 111th US Congress. The House Committees on Agriculture and transportation passed H.R. 872 in March 31, 2011 with the backing of 57 Democrats but was stalled by opponents of this legislation in the Senate. Since this first attack against EPA permit, two other attempts had been made, one in 2013 (H.R. 935) during the 112th Congress and another in 2014 (H.R. 897) in the 113th Congress. The House passed H.R. 935 by a vote of 267-162. Similar bills such as the farm bill or some provisions of other bills had passed the full House, but again stalled in the Senate. The latest bill proposal, S. 1500, the *"Sensible Environmental Protection Act"* of 2015 had passed on August 5, 2015 in the US Senate Committee on Environment and Public Works and was sent to the full US Senate for further consideration with favorable recommendations.

IV.1. Provisions of H.R. 897

The bill would prohibit the EPA or a state from requiring a permit under the Clean Water Act for a discharge from a point source into waters of a pesticide authorized for sale, distribution, or use under FIFRA, or a residue resulting from the application of the pesticide. Point source pollution is chemical waste discharged from a distinct place, such as a pipe, channel, or tunnel (EPA, 2012). The bill establishes exemptions for the discharges containing a pesticide or pesticide residue (see Appendix B). The bill does not create any regulatory burdens and does not impose any costs on state, local, or tribal governments (114th US Congress, 1st Session).

IV.2. Risks/Benefits of public health pesticide applications

Public health officials assess the risk for mosquito-borne diseases against the risk for human exposure to pesticides used to control mosquitoes (Bohan, 2000). The most difficult issue is to balance the risk of using pesticides and benefits of reducing mosquito populations. Pesticides have a role in public health as part of sustainable IVM for the prevention of mosquito borne diseases (Rose, 2001). Mosquito control agencies use four classes of chemical pesticides (organochlorines, carbamates, organophosphates and pyrethroids) to kill larvae and adult mosquitoes (see full list of authorized mosquito pesticides in table 2 in Appendix A). West Nile virus clearly poses risks to the health and welfare of humans, and domestic and wild animals (Carney, 2008). Carney found a direct evidence that aerial mosquito adulticiding is effective in reducing human illness and potential death from WNV infection. Unnecessary exposure to pesticides should be avoided; however the demonstrated health risks from WNV are greater than potential risks associated with mosquito control activities (Dickinson, 2012).

In many cities and towns across the country, public health pesticide applications have been cut due to lawsuit concerns. In certain cases, as in Dallas County Texas in 2012, these concerns have had disastrous results – in that year alone, Dallas County saw 396 cases of West Nile virus – 20 percent of Texas 1,868 total cases, which included 89 deaths statewide (CDC, 2012). Chemical pesticide applications such as larviciding and adulticiding would have likely had lessened the magnitude of the outbreak (Murray, 2013). Despite intense pressures to eliminate the use of public health insecticides the CDC, WHO and other public health agencies agree that it is essential that these products remain available for mosquito-borne disease prevention (Roche, 2002). Indeed, they emphasize that proper use of FIFRA-registered mosquitocides by established mosquito control agencies does not put the general public or the environment at unreasonable risk from runoff, leaching or drift when used according to label specifications (Thier, 2001). ULV applications generate aerosols of fine droplets of pesticides that stay in the air and kill mosquitoes on contact while minimizing the risk for exposure to persons, wildlife and the environment (Bonds, 2012).

Countless approaches claim to be effective and easy to use but fewer have appreciable value in lessening the annoyance and incidence of bites compared to insecticides use. According to Bonds, "*mosquito control pesticides contributes to some of* *known environmental problems, but compared to agricultural methods and materials, mosquito control pesticides are applied at lower dosages and in smaller amounts"* (Bonds, 2012). In Florida, agriculture and lawn care are believed to represent much greater potential impacts to the aquatic environment than does mosquito control (Connelly, 2009). In emergency conditions (epidemics, hurricanes, floods etc.), the application of pesticides as space sprays (either by ground or air) is the common method of choice in order to rapidly limit adult local mosquito production in the affected area (Del Rosario, 2014). In fact, recent research suggests that human health risks from mosquito control pesticides are low and that risks from mosquito-borne infections greatly exceed risks from pesticides to human health (Peterson, 2006). Until vaccines or medicines become available, public health officials will need to maintain their focus on mosquito surveillance, implementation of control measures, and education of people at large about protective measures (Murray, 2013).

IV.3. Potential barriers to the Amendment

Controlling mosquitoes with chemical treatment should be a supplement to the preventive measures of highly infested areas, standing waters, and agricultural land (Bohan, 2000). The risks involved with pesticide application were not widely questioned until the early 1960s when Rachel Carson published Silent Spring (Carson, 1962). Although the research on pesticide uses and their health and environment impacts is controversial, their publications increased public awareness of issues such as:

- Acute and chronic pesticide impacts to humans, wildlife, and other non-target species, and
- The persistence of certain pesticides in food, waters, and the environment.

The negative impacts that pesticides have on children are well known and documented. Children, whose functions are still immature, are more susceptible to toxic effects of pesticides than adult bodies. Children under age six account for more than half of all pesticide poisonings in the United States (Dona, 2003). A study carried out by researchers at the National Center for Environmental Health found that children between the ages of six and 11 had significantly higher levels of pesticides residuals in their bodies than the rest of the population (Dana, 2003). Numerous research publications made similar findings, connecting high levels of pesticides in children blood to the development of impairments and cancers (Dana, 2003). In 2000, the EPA classified malathion, a major adulticide used by many MCPs as a "*likely human carcinogen*" and later revised that classification under the pesticide industry pressures. Depending on the chemical, possible health effects from overexposure to pesticides include cancers, reproductive or nervous system disorders, and acute toxicity.

The National Water-Quality Assessment in 2006 found at least one pesticide is detected in water from all streams tested throughout the country (USGS, 2008). Pesticide contamination of US waters has also been confirmed by state water pollution control agencies. The potential for human exposure to pesticides in waters is a real concern and has been well documented. Pesticides are also toxic to aquatic organisms and plants. There are also ecological risks beyond those to humans, such as direct hazards to non-target and beneficial insects, to aquatic organisms, to birds, and indirectly, to the organisms who feed on these living things (Milan, 2000).

An additional barrier to the passage of the bill is the Obama administration pro-environment leanings. The EPA has extensively enforced its environmental protection regulations under Obama administration even though the Congress refuses to pass any legislation. The goal of the CWA is to maintain and restore the chemical, physical and biological integrity of waters. If a pesticide applicator needs to spray a pesticide into or near a water body, the applicator must obtain and comply with a Clean Water Act permit. This permit specifically requires the applicator to take certain actions that can reduce the amount of pesticide that is released into the water body. The difference between these two protections is important (see table 1 in Appendix A). Under FIFRA, EPA sets forth the maximum amount of pesticide that can be used without causing unreasonable adverse effects on human health and the environment. Under the Clean Water Act, EPA requires certain steps be taken when a pesticide is used with the goal of minimizing the amount of pesticide that goes into the US waterways.

V. Politics behind H.R. 897

Debates over pesticide discharges into waters have occurred throughout the United States since the publication of Rachel Carson landmarked book in the 1960s. In the early 1990s, pro and anti pesticide advocacy groups' relations were very tense. Newspaper articles highlight a concern among health officials that with the growing risk of WNV, spraying bans could endanger lives. There was much discussion of how to balance negative effects of spraying with the benefits of reducing WNV transmission. On the other hand, a growing number of counties across the United States with a long history of community opposition to pesticide use have demanded MCPs cease spraying neighborhoods to kill adult mosquitoes, saying the pesticides were poisoning both the environment and themselves.

V.1. Supports for the bill

Passing laws that protect people's lives and their livelihoods is one of the most important activities that Congress undertakes. Pesticides in the United States are already regulated under FIFRA. The EPA uses that tool to protect the human health and environment, including water resources, from adverse effects of pesticides (Bonds, 2012). Public health pesticides have been used to kill mosquitoes associated with water for decades. They still play a central role when other sustainable IPM approaches are deemed not feasible or available (Thier, 2001). Detection of large number of mosquito larvae in areas where source reduction or biological control are not appropriate may require larvicides treatment or the existence of swarms of adult mosquitoes may necessitate the use of adulticides (Rose, 2001). In addition, budget cuts, lack of proper mosquito and mosquito-borne diseases surveillance, and lack of trained employees to conduct source reduction and offer educational programs to communities are also drivers for resorting to widespread pesticides use, which is the easiest and less expensive way to deal with mosquito swarms (Tomerini, 2005).

In 2011, Rep. Bob Gibbs (R-Ohio), the author of H.R. 872 and other Congressmen, referring to West Nile virus outbreak, urged the Senate to take up legislation that would undo EPA new pesticide permitting regulations (US Congress, 2012). "*Under FIFRA, pesticides must undergo extensive and rigorous testing before being approved. To require a duplicative permit for a pesticide that has already been approved through the FIFRA process is not only arbitrary, it's an unnecessary burden on regulators and applicators and does nothing to improve water quality*," said Rep. Kurt Schrader, D-Oregon, co-sponsor of the bill.

The American Mosquito Control Association lobbied the Congress to act and claimed that the CWA requirements could prohibit pesticide fogging, common practice used by state and local mosquito control agencies. The proposed amendment would ensure that public health missions are not compromised by administrative and financial regulations required by the PGP (AMCA, 2013). At the annual AMCA Conference in 2011, the Commissioner in his concluding remarks stated that "*the new layer of regulations will not provide any foreseeable protection to our nation's waters beyond that already mandated under the Federal Insecticide Fungicide and Rodenticide Act and practiced by mosquito control agencies since their inception*". Mosquito control FIFRA-registered pesticides applications do not involve the discharges of pollutants into the US waters (Grube, 2011). When used according to label and directions requirements, pesticides target mosquitoes with minimal risks to human health and the environment (Tedesco, 2010). In addition, public health employees who mix, load, and apply pesticides are specifically trained to follow proper safety precautions (Rose, 2001). The amount of active ingredient in mosquito control insecticides required for effective control is minimal (Milan, 2000). Safe water and mosquito control using modern products and technology are compatible (Grube, 2011). According to Joe Conlon, Technical Advisor to the American Mosquito Control Association, "*Ironically, the pollution incident leading to the court ruling that CWA-based regulation should also be imposed did not involve mosquito control and was a blatant violation of FIFRA, subject to substantial penalties. It wouldn't have been prevented by the CWA*." Conlon further stated, "*Passage of H.R. 897 will restore the reasonable and practicable regulatory roles played by both FIFRA and the CWA, making both statutes conform with the original intent of Congress that has served* successfully in protecting both our citizens and the environment for over 40 years."

In addition to bipartisan support in the Congress, the bill has also gotten much more support from pesticides industry groups, farmers, foresters, and other landowners making it more controversial. AMCA is neither the only advocate, nor the main driver behind that push for legislative clarification of the conflict between the CWA and the FIFRA regulations (Rose, 2011). The industry had fought through court appeals and had lost major lawsuits with the US Supreme Court subsequently (Homes, 2011). Then, dissatisfied with its inability to undo the Sixth Court decision, the industry backed all pieces of national legislation proposals to achieve what the court had refused to grant (Homes, 2011). Pesticides Industry efforts are led by pesticides users such as CropLife America and the American Farm Bureau Federation. They argued that the NPDES permits put an economic burden on agribusiness. One pesticide leader even stated that:

"*the CWA permit is specifically designed to encourage citizen lawsuits against farmers and other users of pesticides for alleged violations of the permit*".

Although no study exists to indicate how many programs or activities have been eliminated or reduced or being sued due to CWA permit requirements, informal reports from the environmental health workforce indicate that the loss of vector control capacity is severe. In an August 4, 2015 letter to the Environment and Public Works Committee in the Senate, the American Mosquito Control Association stated: "*Currently, mosquito control programs are vulnerable to lawsuits where fines may be up to $35,000 per day for activities that do not involve harm to the environment, as is the standard under FIFRA, but rather simple paperwork violations of the Clean Water Act (CWA). In order to attempt to comply with this potential liability, these government agencies must divert scarce resources to CWA monitoring. In some cases, some smaller applicators have simply chosen not to engage in vector control activities*" (114th Congress, 1st Session). Current research indicated that pesticide application for mosquito control is an effective public health intervention to reduce mosquito-borne disease. Climate changes and global warming adaptation strategies should ensure that adequate resources are available for effective mosquito control so as to manage the nuisance of mosquito and the risk of mosquito-borne diseases.

V.2. Opposition

During the 111th US Congress, then Chairwoman Senator Barbara Boxer (D-California) was the first lawmaker to put a hold on the first proposed bill. She backed her objection with others in opposition to the bill because the "*bill may perversely lead to increased water impairments and higher treatment costs for ratepayers*". She implored her Democrat colleagues to continue to stand strong against all attacks on important environmental protection laws. Because this is a controversial legislation in its content and procedures, the Senate called for public hearings and two-thirds of votes in order for such bill to pass. Since the mandatory implementation of the pesticides general permit, lawmakers (during the 111th, 112th, 113th, and 114th Congresses) have repeatedly attempted to pass a legislation to nullify the 2009 federal court ruling.

Environmental activists have led the fight against any bill in the Congress that would repeal the CWA permit. They argued that the permit is only required of sprayers that apply pesticides in, near, or over waters to treat algae, weeds, invasive species and mosquitoes. According to the Natural Resources Defense Council, the outcry from the farmers and other pesticide applicators is only to divert the real issue and direct their support to the pesticides industry. In fact, run-offs of irrigation water into waterways from farmland that contains pesticides have always been exempt from the Clean Water Act. Environment advocacy groups stated in their letter addressed to Senator Lincoln: "*This bill strips the public of much-needed protection provided by the Clean Water Act from toxic hazards of pesticides applied to or near US waterways by nullifying regulations that require pesticides applicators to apply for NPDES permits*".

Pesticide elimination advocacy groups also joined the fight against the passage of the bill. Pesticides are inherently toxic, and no pesticide is absolutely risk-free (Gratz, 1994). FIFRA alone does not adequately protect waterways from contamination

(Connelly, 2009). FIFRA does not limit the amount of pesticides discharged so long as it has an EPA approved label and is applied accordingly. The requirements under the CWA permit are more environmentally protective than the FIFRA label requirements (Copeland, 2015). For example, EPA general permit for pesticides applied directly to water requires applicators to consider other non-chemical methods of controlling pests, prohibits the use of any pesticide into a water body that is already impaired by that pesticide (or its by-product), and specifies the types of records that must be kept and reported to the EPA or states. None of these things is required under FIFRA. The labeling system did not prevent the unnecessary death of thousands of fish (USGS, 2013). A recent study of major rivers and streams by the US Geologic Survey detected one or more pesticides in over 90% of the surface waters sampled and in one-third of major aquifers. Thousands of people each year report to poison control centers and emergency care clinics after being poisoned by pesticides (CDC, 2012). While statistics on pesticide poisonings are hard to come by because the EPA does not track and document these cases, California does keep records. From 2000-2008 California alone had over 7,600 reported pesticide poisoning cases resulting in almost 200 hospitalizations. About half of these were from agriculture uses, and half from non-agriculture uses. Both the CWA and FIFRA are necessary to provide important protections for the nation's waterways and are not duplicative. FIFRA focuses primarily on labeling pesticides while the CWA requires water quality monitoring, reporting on pesticide use, and implementation of best practices to minimize pesticide pollution of rivers, lakes, and streams.

VI. Summary/recommendations

The PGP went into effect almost five years ago and since 2011, H.R. 897 or the "*Reducing Regulatory Burdens Act*" has never passed the Congress even after repeated attempts. Meanwhile, the permit regulation requirements have never precluded any MCPs to apply pesticides to control mosquitoes. Supporters of the proposed bill continue to argue that the two regulatory laws (FIFRA and CWA) requirements are financially and administratively burdensome to mosquito control activities while critics of the bill argue that both laws have contrasting objectives because they protect people and the ecosystem from different levels of pesticide pollution.

Noting that while pesticides can and do play an important public health role, the use of IVM by MCPs can decrease the problems associated with pesticides and difficulty controlling disease outbreaks and observing that the public has become more concerned about any use of a pesticide in populated areas even when the intended use is for public health vector control; therefore, we encourage and support:

- Efforts to expand the use of integrated vector management techniques and to minimize the unnecessary use of toxic pesticides in vector control while maximizing public health protection from vector-borne diseases; and
- Promotion and funding by federal, state and local public health and environmental health agencies of the use of integrated vector management techniques to control public health vectors.

It is the general consensus, clearly, that the *laissez-faire* solution for pesticide use is intolerable and the choice among alternatives must be clear; protecting the quality of United States water resources from pesticides contamination is also a public health intervention aimed at protecting the public health and the environment, so removing that regulatory layer would likely be perceived as a free pass for pesticide industry interest groups to pollute more and not be held accountable.

VII. Conclusion

The risk of human infection with a mosquito-borne pathogen in the United States is generally low; however, even the nuisance or the perceived threat of infection may cause public alarm and a demand for public health action (Labeaud, 2010). Virtually every pesticide currently used to manage mosquito populations has the potential to adversely impact human health and the environment. Debates over the use of pesticides for public health vector control have sometimes divided the public health and environmental communities at the local, state, and national levels at a time when maximizing public health and environmental protection requires close coordination and mutual trust between those communities.

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Appendix A.

Table 1. Comparative table between FIFRA and CWA differences

FIFRA	Clean Water Act
Weighs costs and benefits nationally, without regard to local pesticide impacts, so that non-environmental considerations trump local water protection concerns in every instance.	Establishes more localized protections by state—not federal—experts at a level safe for human health and fish populations.
Does not regulate pesticide applications on a water body-specific basis because product labels must be generalized for the whole nation.	Focuses on the specific needs and beneficial uses of local water bodies
Ignores that pesticides are likely to be mixed with other chemicals—including other pesticides—once they are released into the environment.	Accounts for real-world circumstances of pesticide applications.
Ignores the toxicity of so-called "inert" ingredients by focusing only on the impacts of the active ingredient. These ignored ingredients could be more toxic or pose greater risks than the active ingredient	Assesses the toxicity of the pollutants as a whole, rather than focusing on only one "active" ingredient.
No requirement to report on particular pesticide uses or any post-use monitoring to determine whether untoward environmental impacts have occurred	Requires dischargers to provide information to ensure pesticide applications do not cause violations of applicable standards
Little to no statutory enforcement because it is nearly impossible to ensure that every application complies with the labeling requirement. Enforcement is left to the states, which are generally inadequately staffed to provide much field enforcement.	Allows enforcement by waterway users and those harmed by pesticide pollution, which supplements the efforts of under-funded governmental agencies

Table 2. Pesticides used for mosquito control in the United States

Name	Trade name	Formulation	Application	Advantage	Limitation
Temephos	Abate	G, EC	Larvae	Usually lowest cost	Non-target effects, some resistance
Methoprene	Altosid	G, B, P, LC	Larvae	Residual briquettes, non target safety	Cannot be certain of performance until too to retreat
Oils	BVA, Golden Bear	Oil	Larvae, pupae	Acts on pupae	Oil film, subsurface larvae
Monomolecular film	Agnique	Liquid	Larvae, pupae	Acts on pupae	Subsurface larvae
Bacillus thuringiensis israelensis (Bti)	Aquabac, Bactimos, LarvX, Teknar Dunks	WDG, AS, P, G, B	Larvae	Nontarget safety, Briquets control 30+ days	Short window of treatment opportunity. Pupae
Bacillus sphaericus (Bs)	VectoLex	G, WDG	Larvae	Nontarget safety	Pupae, only works in fresh water
Malathion	Fyfanon Atrana	ULV, thermal fog	Adults	Tolerances	OP, some resistance
Naled	Dibron Trumpet	ULV, EC, thermal fog	Adults	Tolerances	OP, corrosive
Fenthion	Batex	ULV	Adults	None specified	OP, Florida only, RUP, tolerances
Permethrin	Permanone AquaResilin, Biomist, Mosquito-Beater	ULV, Thermal fog, Clothing treatment	Adults, clothing treatment for ticks and mosquitoes	Low vertebrates toxicity	None specified
Resmethrin	Scourge	ULV, thermal fog	Adults	Low vertebrate toxicity	None specified
Sumithrin	Anvil	ULV, thermal fog	Adults	Low vertebrate toxicity	No tolerance
Pyrethrins	Purenone, Pyronyl	ULV, EC	Adults, larvae	Natural pyrethrum, tolerances	May be costly

AS = Aqueous Suspension; B = Briquets; EC = Emulsifiable Concentrate; G = Granules; LC = Liquid Concentrate; P = Pellets; ULV = Ultra Low Volume; WDG = Water-Dispersible Granule; OP = Organophospate insecticide; RUP = Restricted Use Product

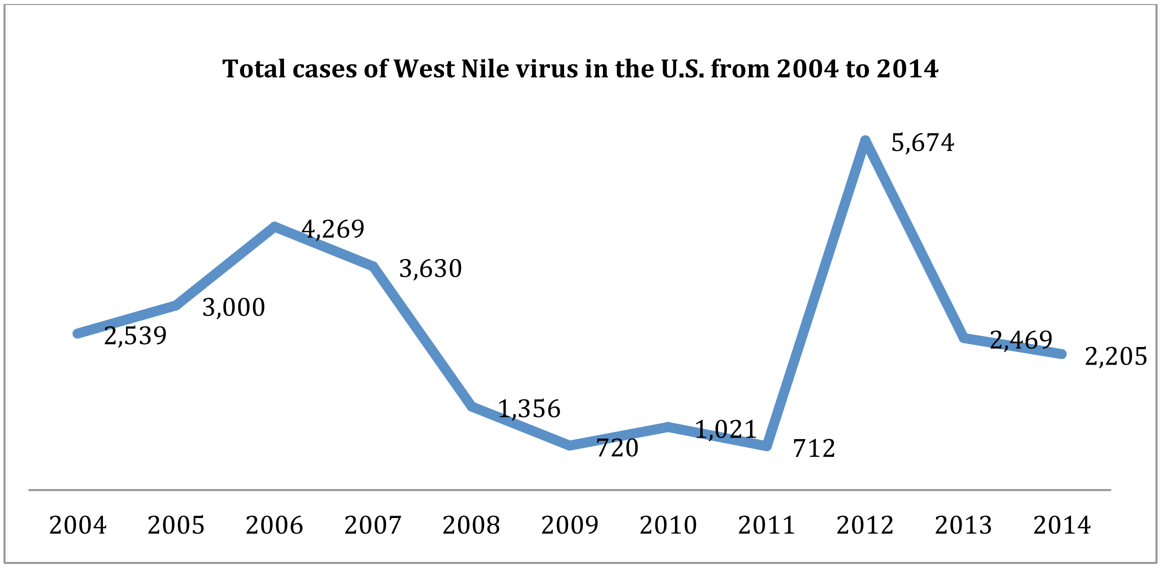

Figure 1- West Nile virus disease cases reported to CDC, 2004-2014

Appendix B

H.R.897 — 114th Congress (2015-2016)

Introduced in House (02/11/2015)

114th CONGRESS
1st Session

H. R. 897

To amend the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Water Pollution Control Act to clarify Congressional intent regarding the regulation of the use of pesticides in or near navigable waters, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES
February 11, 2015

Mr. Gibbs introduced the following bill; which was referred to the Committee on Transportation and Infrastructure, and in addition to the Committee on Agriculture, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

A BILL

To amend the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Water Pollution Control Act to clarify Congressional intent regarding the regulation of the use of pesticides in or near navigable waters, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. Short title.

This Act may be cited as the “Reducing Regulatory Burdens Act of 2015”.

SEC. 2. Use of authorized pesticides.

Section 3(f) of the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136a(f)) is amended by adding at the end the following:

"(5) USE OF AUTHORIZED PESTICIDES.—Except as provided in section 402(s) of the Federal Water Pollution Control Act, the Administrator or a State may not require a permit under such Act for a discharge from a point source into navigable waters of a pesticide authorized for sale, distribution, or use under this Act, or the residue of such a pesticide, resulting from the application of such pesticide.".

SEC. 3. Discharges of pesticides.

Section 402 of the Federal Water Pollution Control Act (33 U.S.C. 1342) is amended by adding at the end the following:

"(s) Discharges of pesticides.—

"(1) NO PERMIT REQUIREMENT.—Except as provided in paragraph (2), a permit shall not be required by the Administrator or a State under this Act for a discharge from a point source into navigable waters of a pesticide authorized for sale, distribution, or use under the Federal Insecticide, Fungicide, and Rodenticide Act, or the residue of such a pesticide, resulting from the application of such pesticide.

"(2) EXCEPTIONS.—Paragraph (1) shall not apply to the following discharges of a pesticide or pesticide residue:

"(A) A discharge resulting from the application of a pesticide in violation of a provision of the Federal Insecticide, Fungicide, and Rodenticide Act that is relevant to protecting water quality, if—

"(i) the discharge would not have occurred but for the violation; or

"(ii) the amount of pesticide or pesticide residue in the discharge is greater than would have occurred without the violation.

"(B) Storm water discharges subject to regulation under subsection (p).

"(C) The following discharges subject to regulation under this section:

"(i) Manufacturing or industrial effluent.

"(ii) Treatment works effluent.

"(iii) Discharges incidental to the normal operation of a vessel, including a discharge resulting from ballasting operations or vessel bio-fouling prevention."

Appendix C:

The American Public Health Association: Maximizing Public Health Protection with Integrated Vector Control.

Noting that integrated pest management is a combination of educational, cultural, biological, physical, chemical, and legal measures to control pests and that the application of pesticides is reduced by the use of pest parasites, pathogens, pheromones, predators, and resistant crops, thus reducing the unnecessary exposure of humans to harmful chemicals; and

Observing that numerous arthropods and rodents serve as the vector of serious human diseases such as viral encephalitis, Rocky Mountain spotted fever, Hantavirus, and malaria; and

Noting that hazard surveillance (monitoring environmental conditions to identify conditions that may contribute to the emergence or re-emergence of vectors), disease health surveillance, laboratory identification, vector management and medical intervention continue to be important factors in preventing morbidity and mortality from vector-borne disease; and

Recognizing that recent experience with West Nile encephalitis and Hantavirus indicate that efforts to combat vector-borne diseases are becoming more complex and difficult to manage and can have transnational implications; and

Noting that public health agencies in health and environmental departments in state and local government have primary responsibility for management of vectors; and

Noting that the capacity of local and state health and environmental agencies to conduct basic functions such as hazard surveillance for the purpose of early identification of vector borne outbreaks has been seriously eroded or eliminated over the past several decades; and

Recognizing that integrated vector management that seeks to minimize unnecessary health and environmental side effects of vector control activities while assuring maximum protection to the public and workers is a long-standing and well established public health principle and practice; and

Noting that in 1996 under the Food Quality Protection Act (FQPA) the Congress mandated that the Department of Health and Human Services assess vector control needs as part of Environment Protection Agency's review of pesticides, including insecticides and rodenticides; furthermore, the FQPA allows for public health benefits to be considered in weighing the risks of public health pesticides as part of EPA's regulatory process; and

Recognizing that in the U.S., despite the 1996 mandate of the FQPA, the DHHS has no evident activities in this area, leaving state and local vector control agencies with great uncertainty about what tools will be available to them for managing public health vectors; and

Noting that while pesticides can and do play an important public health role, the use of IVM (integrated vector management) can decrease the problems associated with pesticides and difficulty controlling disease outbreaks; and

Observing that the public has become more concerned about any use of a pesticide in populated areas even when the intended use is for public health vector control; and

Recognizing that the public health use of pesticides constitutes only a very small fraction of the total pesticides manufactured and used in the US and further recognizing that some pesticides used for public health vector control may become unavailable due to actions taken to protect public health by reducing the uses of some highly toxic pesticides in agriculture, homes, and other commercial markets; and

Noting that debates over the use of pesticides for public health vector control have sometimes divided the public health and environmental communities at the local, state, national, and international levels at a time when maximizing public health and environmental protection requires close coordination and mutual trust between those communities, therefore, encourages and supports:

1. Efforts to expand the use of integrated vector management techniques and to minimize the unnecessary use of toxic pesticides in vector control while maximizing public health protection from vector-borne diseases;
2. Aggressive environmental and disease surveillance and early identification of conditions that promote the growth or introduction of vectors, as well as vector borne disease outbreaks, to prevent morbidity and mortality and to ensure that outbreaks can be controlled when they are small, thus minimizing the potential need for pesticides;
3. Increased federal funding to CDC to help support the efforts by the CDC, states and local government to strengthen efforts in laboratory identification, vector management, and nationwide surveillance of vectors and vector-borne disease with the goal of an integrated surveillance effort;

4. Efforts by and the provision of resources to the Centers for Disease Control and Prevention to establish the needed capability to carry out toxicology and vector management assessments of pest control agents as required by the 1996 Food Quality Protection Act, such efforts including evaluation of non-pesticides alternative means of vector control;
5. Promotion and funding by federal, state and local public health and environmental health agencies of the use of integrated vector management techniques to control public health pests;
6. Funding to state and local governments for larvicides and other preventive measures should be available to state and local health departments along with resources and the ability to act quickly when necessary;
7. Efforts by the Centers for Disease Control and Prevention in coordination with state and local agencies, involvement of stakeholders in decision making, risk communication and education to bring the public, states, and others together to address this issue;
8. Efforts by HUD and state and local agencies to assure healthier home environments through appropriate prevention and management of vectors;
9. Increased health communication and education efforts regarding risks, concepts of integrated vector management, personal protection actions, and individual efforts that can decrease transmission through outreach and advocacy programs for the general population and populations at risk; and
10. International efforts by the World Health Organization, United Nations Environment Program, Food and Agriculture Organization and the US government, in support of the treaty negotiations on Persistent Organic Pollutants and other efforts to reduce pesticide risks internationally, to rapidly identify effective methods of vector control that do not rely on highly hazardous pesticides while recognizing the current important public health role of pesticides.

Biographical Sketch

This capstone project has been completed by Charles Guissou. He is an international Fulbright fellow at the University of Kentucky College of Public Health. He earned a Medical Doctor's degree from the University of Ouagadougou, Burkina Faso in 2009. Charles is professionally licensed to practice general medicine in Burkina Faso and will get credentials in Population Policy Health and Management upon completion of his Master of Public Health degree from the University of Kentucky in 2016. Charles will return to his home country where his work will focus on health policy design, implementation, and evaluation at the country level.

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