Mosquito Abatement Information and Guidance Document

(1/03)

An effective mosquito control program is a comprehensive activity that considers not only the control of mosquitoes (i.e., species of public health importance) as its ultimate objective, but also the means by which safe and efficient control is achieved with minimal environmental and public health impact.

1.0 Statutory Authority:

1.1 **Title 32, Special Districts**

32-1-101. Special District Act

32-1-102. Legislative declaration: "...organization of special districts providing the services and having the purposes, powers, and authority provided in this article will serve a public use and will promote the health, safety, prosperity, security, and general welfare of the inhabitants of such districts and of the people of the state of Colorado."

Although the stated purpose of "Special Districts" is to provide public services to promote "...the health, safety, prosperity, security, and general welfare of the inhabitants of such districts and of the people of the state of Colorado", the act is also meant to prevent the duplication or fragmentation of local government services, excessive taxation of local residents, and consolidate the functions and services of special districts. In doing so, the act requires that "special districts" be multifunctional in purpose. Therefore, new special tax districts must provide services in more than one program area (i.e., fire protection, mosquito control, parks and recreation, safety and protection, sanitation, solid waste removal, street improvement, TV relay, transportation, and water (see section 32-1-103(10), C.R.S.)). Experience has shown that the formation of a new, multifunctional special tax district to be cumbersome, especially when attempting to combine services of a similar nature. In addition, any tax increase to accommodate the added services would require a vote of districts residents. Therefore, mosquito control programs could be added to existing special districts or combined with other needed services to form a special district, but an effort to develop a special district only for mosquito control could likely not be successful.

1.2 **Title 30, Government – County**

Article 11, County Powers and Functions

30-15-401, General regulations: (1)"in addition to those powers granted by sections 30-11-101 and 30-11-107 and by parts 1,2, and 3 of this article, the board of county commissioners has the powers to adopt ordinances for control or licensing of those matters of purely local concern which are described in the following enumerated powers:"

(a)(V) To do all acts and make all regulations which may be necessary or expedient for the promotion of health or the suppression of disease, limited to the following:

3. "In addition to the authority given counties under article 5 of title 35, CRS, to establish mosquito control areas, to assess the whole cost thereof against those persons especially benefited [sic] by the service, …"

Authority concerning local health and disease issues is bestowed by statute to the Colorado Department of Public Health and Environment and certain authorities are also granted by statute to local boards of county commissioners and municipal authorities. In general, local regulatory programs cannot be less stringent then the equivalent state program. Since the above statute clearly provides authority to counties to establish mosquito control areas, it stands to reason that such programs can be managed at the county level. In addition, given the local nature of mosquito issues, the most reasonable and expeditious means of establishing and funding a mosquito control program within a county lies in the powers of the board of county commissioners or municipal authorities.

1.3 **Title 35, Agriculture**

Article 4, Pest Control Act

35-4-103. Administration: "A board of county commissioners shall concurrently administer this article and shall have full authority for the proper enforcement thereof by county pest inspectors employed by said board of county commissioners."

35-4-104. County pest inspectors. "The persons who may be employed under this article aside from employees of the department of agriculture, shall be county pest inspectors and their deputies, who shall be appointed by the board of county commissioners of the county where they are to serve and receive their pay..."

i. "County pest inspector" means any qualified employee of a board of county commissioners employed under this article.
ii. "Insect pests" means any of the small invertebrate animals in the phylum arthropoda which are injurious to plants and animals

Article 5, Pest Control Districts

35-5-103. Methods of control – rules and regulations. The commissioner (of Agriculture) is empowered to designate the methods to be used for the control or eradication of the various noxious weeds, insect pests, and plant diseases and to publish such methods and make and publish such reasonable rules and regulations as are proper and necessary to carry into effect the provisions of this article. The commissioner is authorized to enter into agreements with any landowner, lessee, district, city, or town, or with federal, state, or county agencies for cooperation and for cost – sharing in the control and eradication of noxious weeds, insect pests, or plant disease located upon land that they control or administer within the district in keeping with the provisions of this article. The commissioner, with the approval of the governor is authorized to advance funds, which may be appropriated for this purpose subject to reimbursement, to carry into effect the provisions of this article.

i. "Pest" as determined by the commissioner, means a noxious, destructive, or troublesome plant, insect, or plant disease, when found to be in epidemic proportions and of sufficient economic importance to threaten the public welfare.

Although this statute appears very accommodating in its language for establishing a means to control insect pests and for providing a mechanism to fund the cost of the program, its intent is probably more in-line with controlling agricultural insect pest rather than insect pests/vectors of public health concern. There have been reported

instances in the past when counties have attempted to use this statute to establish a pest control district for the purpose of mosquito control without success. Moffat County Pest Management is a county pest control operation that was established to control agricultural insects pests (grasshoppers, locusts, etc.), as well as mosquitoes. However, the pest control district was established under Title 35, Articles 4 and 5 and the mosquito control program was established under a separate statute, Title 30, Article 11 County Powers and Functions. This is according to Bruce Johnson, Mosquito Control Coordinator, Moffat County Pest Management.

2.0 Pesticide Applicator License Requirements

2.1 Definitions: (Taken from the Pesticide Applicators' Act, Title 35, Article 10, and the Rules and Regulations Pertaining to the Administration and Enforcement of the Pesticide Applicators' Act where noted)

- 35-10-103(12): "Public (and Limited Commercial) Applicator" means any **agency** of the state, any county, city and county, or municipality, or any other local governmental entity or political subdivision which applies pesticides.
- 35-10-103(13): "Qualified Supervisor (QS)" means any individual who without supervision evaluates pest problems, or recommends pest control using pesticides or devices, or mixes, or loads, or applies any pesticide, or sells applications services, or operates devices, or supervises others in any of these functions.
- 35-10-103(1): "Certified Operator (CO)" means an individual who mixes, loads, or applies any pesticide, including restricted use pesticides, under the supervision of a qualified supervisor.
- *"Registering with the Colorado Department of Agriculture (CDA)" means any agency of the state, any county, city and county, or municipality, or any other local governmental entity or political subdivision which applies general use pesticides may voluntarily register with the CDA, if they are applying **only** general use pesticides. Public applicators **must** register with CDA if applying Restricted Use Pesticides.*
- *"Commercial Mosquito Control Applicator" means a person engaged in the business of applying pesticides (general or restricted), for hire, to control mosquitoes. Any entity/business offering these services must have a Commercial Applicator business license, issued through the Colorado Department of Agriculture (CDA). Any person acting as the designated Qualified Supervisor (QS) for the business must also be licensed in the appropriate categories (e.g., Public Health Pest Control, category 110).*

2.2 *Public applicators applying **only** general use pesticides are **not** required to have staff that are licensed as either a QS or CO by the Colorado Department of Agriculture (CDA).*

2.3 *Public applicators are **not** required to register with the CDA if they apply **only** general use pesticides.*

2.4 *Public applicators applying **only** general use pesticides **may** voluntarily register w/ the CDA. Such registration requires public applicators to meet many of the same requirements as a commercial business license.*

2.5 *Governmental entities (public applicators) **not** registered with the CDA are not regulated*

by that agency. Instead, unregistered public applicators are regulated by the U.S. Environmental Protection Agency (EPA). Complaints of misapplication of pesticides are investigated and prosecuted by EPA and subject to federal fines.

2.6 Registration with CDA requires the following:

i. The governmental entity (public applicator) must complete the required application.
ii. Pay a registration fee of $50.00 to the CDA.
iii. Send a letter to the CDA requesting they attach a QS who holds the correct pest management categories they intend to work in (e.g., Public Health Pest Control, category 110).
iv. A letter from a QS requesting that his/her license be attached to that governmental entity (public applicator).

- Registering with the CDA obligates the governmental entity (public applicator) and the attached QS to the same regulatory requirements observed by commercial applicators such as the correct application of pesticides, adherence to all applicator regulations, providing verifiable training to all applicator technicians (as outlined in Part 5 of the Rules), and the maintenance of application records. In addition, if more than one (1) QS or CO is employed by the governmental entity (public applicator), they must all be attached / linked to the registration. Employees working under the supervision of the designated Qualified Supervisor (QS) must hold either a QS license or a CO license in the specific category the entity is working in, if not, they must be trained as an applicator technician.
- If any restricted use pesticide (RUP) application is performed in the course of the year, the public applicator must register with the CDA and meet all of the requirements outlined above, prior to that pesticide application taking place. Failure to do so may result in actions being taken against the public applicator for violations under the Pesticide Applicator's Act.
- Violations under the Pesticide Applicator's Act will be investigated and prosecuted by CDA.

2.7 Colorado Department of Agriculture *recommendations:*

- *CDA recommends that all individuals applying pesticides be licensed at the certified operator (CO) level regardless if the governmental entity (public applicator) is registered with the CDA.*
- *CDA also recommends that any mosquito control program employ at least one person who holds an applicator license in the Public Health Pest Control category (110).*

2.8 *Advantages to registering with the Colorado Department of Agriculture:*

- *Registration shows the public that individuals conducting mosquito control activities possess the basic safety and application knowledge to perform these applications, especially when control activities involve adulticiding.*
- *Liability considerations.*

3.0 **Mosquito Surveillance and Control:**

The foundation of an efficient and effective mosquito control program lies in the information that can be gathered relative to breeding habitat, relative numbers, and species.

3.1 Importance of surveillance:

- Identifying and mapping the locations of mosquito breeding habitat can provide efficient and effective control opportunities before mosquitoes take wing.
- **Adult** mosquito surveillance: accurate adult mosquito surveillance creates a body of data from which public health decisions on the relative risk of disease transmission can be more accurately assessed by tracking relative numbers of vector species from year to year.
    i. Data can be used to detect early evidence of virus transmission.
    ii. Surveillance provides pertinent data from which control decisions can be made (e.g., species*, minimum infection rates, distribution, etc.).
    iii. Surveillance improves control efficiency by directing resources where and when it is needed most at the appropriate time, thus minimizing unnecessary chemical applications and the impact of chemicals on residents and the environment.
    iv. Pre and post control surveillance data provides a means to assess the effectiveness of control activities (larval and adult).
    v. Surveillance of mosquito populations allows control strategies to customize control efforts to fit the need (public health vs. nuisance).
    *species data can provide valuable information regarding breeding habits, feeding habits, significance as a disease vector, etc.

3.2 Surveillance methods:

- Larval mosquito surveillance methods: **see CDC publication "Mosquitoes of Public Health Importance and Their Control" pages 51 to 55†**.
- Adult mosquito surveillance methods: **see the CDC Guidelines for Arbovirus Surveillance in the United States, Appendix II Techniques and Equipment for Adult Mosquito Surveys‡.**

3.3 Mosquito Control: the most efficient method for long-term program success is a systematic approach from more than one direction.

- Integrated Pest Management (IPM): combining a number of compatible techniques to suppress mosquito populations to a point where their impact on (public health and as a nuisance) is minimized.
- Components of a comprehensive mosquito IPM program include:
    i. Regular surveillance (pre-treatment): monitoring mosquito populations (i.e., adult mosquito collections and dipping for larvae), species identification, record keeping, and mapping breeding site locations.
    ii. Control: integrating natural and artificial methods to control all mosquito life stages **(see CDC publication "Mosquitoes of Public Health Importance and Their Control" pages 58 to 68) †.**
        3.31 Larvae / pupae control: because mosquito larvae and pupae are confined to water, these life stages are the most effectively and efficiently controlled; involving a multitude of chemical and non-chemical options.
            1) Source reduction: elimination or modification of breeding habitat.
                a. Good water management practices (e.g., flood irrigation, ditch design and maintenance, etc.).
                b. Elimination / reduction of artificial breeding containers (e.g., stock tanks; bird baths; un-maintained, partially drained swimming; tire dumps; etc.).

c. Modification of natural and artificially impounded water (e.g., steepening shorelines, vegetation management, adequate drainage, seepage control, etc.)
d. Elimination of natural breeding habitat (e.g., tree holes, filling depressions and low lying areas, etc.)

2) Biological control: use of predatory, larvivorous fish and insects in natural and artificially impounded waters susceptible to mosquito production.

3) Chemical control: natural and artificial insecticides are currently available in various formulations (**see attached list A of currently approved chemical agents for larva control.**).
   a. Insect growth regulators (IGR's): growth hormones that interfere with mosquito development. Not effective on eggs, first instar larvae, and pupae. Target specific depending on dosage. Mosquito larvae very sensitive to low dosages
   b. Endotoxins: species-specific endotoxins produced by bacteria that causes paralysis of the mid-gut when ingested by larvae. Limited effectiveness on 4th instar larvae if normal application rates are used; not effective on pupae.
      - B.t.i. (*Bacillus thuringiensis israeliensis*): higher application rates recommended in highly polluted water. Available in a variety of formulations.
      - B.s. (*Bacillus sphaericus*): most effective against Culex spp. of mosquito, less effective against Aedes spp. Intended for use in highly polluted (organic) water. Available in a variety of formulations.
   c. Surface films: primarily oils that are used to suffocate pupae (and larvae) when the use of other products is not effective (e.g., 4th instar larvae and pupae).
   d. Chemical agents: primarily pyrethrins, malathion, and temephos (Abate) are currently registered in Colorado for larva control.

3.32 Adult mosquito control: adulticiding should be considered a temporary, stop-gap measure where larva control was insufficient or as an emergency measure if disease surveillance indicates that virus is circulating in the adult mosquito population (i.e., mosquito testing, bird and susceptible mammal surveillance). Space application of pesticides (i.e., spraying) is a temporary means of control since mosquitoes from untreated areas can move into an area recently treated. Adult mosquito control is limited to chemical agents.
   a. Chemical control: **see attached list B of currently approved mosquito adulticides.**
      ° Ground unit application: control is achieved by physical contact of an insecticide with the target species. Non-target species can also be affected.

- Ultra low volume (ULV): state of the art method of space spraying utilizing low volumes (2 to 4 oz./acre) of technical grade insecticide
- Fog generators (includes mechanical fog generators, thermal fog generators, and cold fog generators): an older, less efficient means of dispensing adulticide using a variety of machine types that produce fine droplet sizes of 0.1 to 50 microns that uses 0.5 to 8 oz. technical grade insecticide per gal. of carrier oil (or non-thermal water emulsion) that transports the insecticide in a cloud of smoke. Most effective application for adult mosquito control are during evening, night, or early morning hours.
- Mist blowers: adulticide is mechanically atomized into 50 to 100 micron droplets that settle fairly rapidly on structures, foliage, etc. where resting adult mosquitoes come into contact with the agent.

° Aerial application (larvacide and adulticide): a viable consideration when mosquito control is necessary in large and / or inaccessible areas. Economics obviously plays a role in making an aerial application decision. That is, the cost of an aerial application of pesticides can be more economical when treatment area, accessibility, man-hours, equipment resources, etc. are factored in.

-There may be issues of pesticide label restrictions (e.g., water, agricultural crops, etc.) that may make aerial application difficult.

iii. Integration of larvae and adult mosquito control programs provides a full spectrum control program that maximizes control, minimizes environmental and public health impact, and reduces the potential for mosquito resistance to chemical insecticides.

iv. Post treatment surveillance: essential to determine the success or shortcomings of a control program / application. Where pretreatment surveillance data directs control resources to where it is needed, post treatment data provides information on the relative success of the control efforts and re-direct additional treatment if necessary. Without such data there can be no objective accountability for the program and the work being done.

3.4 **Refer to the Colorado Mosquito Control Resource Index**

† *Mosquitoes of Public Health Importance and Their Control*, US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention.

‡ *CDC Guidelines for Arbovirus Surveillance in the United States, Appendix III Techniques and Equipment for Adult Mosquito Surveys,* US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Infectious Diseases, Division of Vector-Borne Infectious Diseases, Ft. Collin, Co., April, 1993.