Integrated Vector Management
Immature Mosquito Guidelines

Source Assessment

Criteria	*Evaluation*	*Decision*
Is development site a vernal pool?	Yes →	Do not walk into vernal pond. **Sample** development site (return water to pond) Then consider **ecological criteria (**do not introduce biologicals into the vernal pond)
No ↓		
Fairy shrimp present?	Yes →	**Sample** development site (return water to pond) Then consider **ecological criteria (**do not introduce biologicals into site)
No ↓		
Are endangered species present?	Yes →	Has supervisor been consulted about habitat? **Avoid taking *[1]endangered species.** If collected, return endangered species to habitat**.** **Sample** development site, then consider **preventive physical measures**
No ↓		
Environmentally sensitive habitat**[1]**?	Yes →	Consult supervisor about habitat. Avoid damage to sensitive areas **Sample** development site, then consider **preventive physical measures**
No ↓		
Will mosquitoes develop it the habitat?	No →	Consult supervisor about habitat. Consider reducing site surveillance. **Sample** development site, then consider **preventive physical measures**
Yes ↓		
Sample development site Then consider **preventive physical measures**		

Preventive Physical Measures

Criteria	*Evaluation*	*Decision*
Can I **eliminate** the mosquito development site? Or Can I **remove the water**? Or Can I **drain** the mosquito development site?	Yes →	Institute necessary preventive **physical measures**
No ↓		
Can habitat be modified to reduce mosquito development?	Yes →	Consult with **Water Management Department** Institute necessary preventive **physical measures**
No ↓		
consider **preventive biological measures**		

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Preventive Biological Measures

Criteria	*Evaluation*	*Decision*
Will habitat support immature mosquitoes?	No →	Do not apply biologicals. Set a **return inspection date**
Yes ↓		
Time water will remains in MDS?	Intermittent→	**Consider ecological criteria**
Semi-permanent or permanent ↓		
Environmentally sensitive habitat*[1]?	Yes →	Consult with supervisor before release. Can stock if available**: backswimmers, flatworms, R. culicivorax, or L. giganteum**
No ↓		
Water Quality?	Highly organic →	Stock with **guppies or consider ecological criteria** Set a **return inspection date** and **record data**
Fresh ↓		
Swimming pool or backyard pond?	Yes →	Can stock **threespine stickleback, guppy or mosquitofish** Set a **return inspection date** and **record data**
No ↓		
Can apply if available**: mosquitofish, guppies, backswimmers, flatworms, R. culicivorax, or L. giganteum** Set a **return inspection date** and **record data** Or consider **ecological criteria**		

Ecological Criteria

Criteria	*Evaluation*	*Decision*
Mosquito stages present?	eggs →	Do not treat. Set a **return inspection date**
1st to pupa ↓		
Number of immature mosquitoes?	*Aedes sp, Culex sp, Culiseta sp, Ochlerotatus sp, or Orthopodomyia sp.* **0** immature/20 dips → *Anopheles sp.* or *Coquillettidia sp* **0** immature/40 dips →	Do not treat. Set a **return inspection date**
Aedes sp, Culex sp, Culiseta sp, Ochlerotatus sp, or Orthopodomyia sp. **1** immature/20 dips *Anopheles sp or Coquillettidia sp.***1** immature/40 dips ↓		
Beneficials present with immature mosquitoes?	*Aedes sp, Culex sp., Culiseta sp, Ochlerotatus sp, or Orthopodomyia sp* **1** immature/20 dips → *Anopheles sp or Coquillettidia sp.***1** immature/40 dips →	Do not treat. Set a **return inspection date**
Aedes sp, Culex sp, Culiseta sp, Ochlerotatus sp, or Orthopodomyia sp. **2** immature/20 dips *Anopheles sp or Coquillettidia sp.* **2** immature/40 dips ↓		
Consider **target population modification**		

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Target Population Modification*

Criteria	*Evaluation*	*Decision*
Mosquito development site size?	more than 5 acres →	Consult with supervisor before treatment
less than 5 acres ↓		
Water quality?	moderate to highly organic *Culex sp*. sources →	Apply appropriate **public health pesticide***[2] and consider **treatment methods**
Fresh ↓		
Majority of immature stages present?	late 4th to pupae →	Apply appropriate **public health pesticide***[2] and consider **treatment methods**
1st to early 4th ↓		
Vernal pool?	Yes →	Apply only *Bti* and consider **treatment methods**
No ↓		
Fairy shrimp present?	Yes →	Apply only *Bti* and consider **treatment methods**
No ↓		
Apply appropriate **public health pesticide***[2] and consider **treatment methods**		

Treatment Method

Criteria	*Evaluation*	*Decision*
Distribution of immature?	Isolated locations →	Treat **selectively**
Throughout source ↓		
Treat **entire** mosquito development site		

MDS = mosquito development site

Examples of environmental sensitive habitats*[2] : wetlands, riparian areas, organic farms, State, Federal, local wildlife areas or other areas posted as such.

*1 -The Endangered Species Act defines take to mean ”harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct”

Public health pesticide (PHP) use and resistance management*[2]

1. Consult PHP’s label before treatment
2. Apply PHP’s within the same class or mode of activity on a rotational basis by the following guidelines unless no other alternatives are available:
   a. Slow release PHP formulations rotate to a new class **after three consecutive applications** to the same site.
   b. Short-lived PHP’s formulations rotate to a new class **after ten consecutive applications** to the same site.

Note: applications can be over more than one year

Factors or conditions that may modify immature mosquito management guidelines

1. Sentinel chicken seroconversion
2. Human malaria or encephalitis occurrence
3. Unforeseen biological or environmental conditions
4. Legal or political legislation
5. Availability of District funding, resources or equipment
6. Availability of suitable larvicides
7. Susceptibility of immature mosquito populations to larvicides
8. Environmental conditions not listed in the program
9. Continued occurrence of immatures in a development site
10. Encephalitis or malaria mosquito pool isolation
11. Natural disasters