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## **MOSQUITO MANAGEMENT AND PESTICIDE USE PLAN FOR DEER FLAT NATIONAL WILDLIFE REFUGE, LAKE LOWELL SECTOR 2011**

### **Introduction**

The Canyon County Mosquito Abatement District has been managing the mosquito population around the Lake Lowell Sector of DFNWR for twelve years. The presence of Western Equine Encephalitis (WEE) was detected in cattle on ranch property that borders the south boundary of the refuge in 1999. Active arbovirus surveillance in the adult mosquito population was initiated in 2000. In 2006 there was a West Nile Virus outbreak in Idaho. Lake Lowell Sector accounted for 40% of the positive West Nile pools detected and tested in Canyon County during the 2006 epidemic. In 2010 there was no disease activity noted in the mosquito population on Deer Flat National Wildlife Refuge.

CCMAD utilizes Integrated Pest Management principles in maintaining mosquitoes on Deer Flat National Wildlife Refuge and only uses *Bacillus thuringiensis israelensis* base materials to manage mosquito larvae populations. No mosquito adulticide activity is conducted within the refuge boundaries. There are mosquito adulticide operations in the surrounding subdivisions and property that is adjacent to refuge property.

CCMAD bases all its mosquito abatement decisions on a comprehensive inspection and surveillance program. Both the larval and adult populations are monitored every week during the mosquito production season. Treatments to the mosquito larvae population are made when dip counts of *Culex tarsalis* reach **5 mosquito larvae per dip/10 dips**. Off refuge adulticide activity is conducted when trapped mosquito numbers reach 25 mosquitoes per night.

## 2009 and 2010 Mosquito Population Comparison

In 2010 there was no early season spike in *Culex tarsalis* population numbers as in 2009 (Figure 1). Compare this to the population spike in early June in 2009 (Figure 2). *Culex tarsalis* is the primary vector of West Nile Virus and Western Equine Encephalitis on Deer Flat National Wildlife Refuge. This population suppression of *Culex tarsalis* was mainly due to the unseasonable cool weather through May and June of 2009.

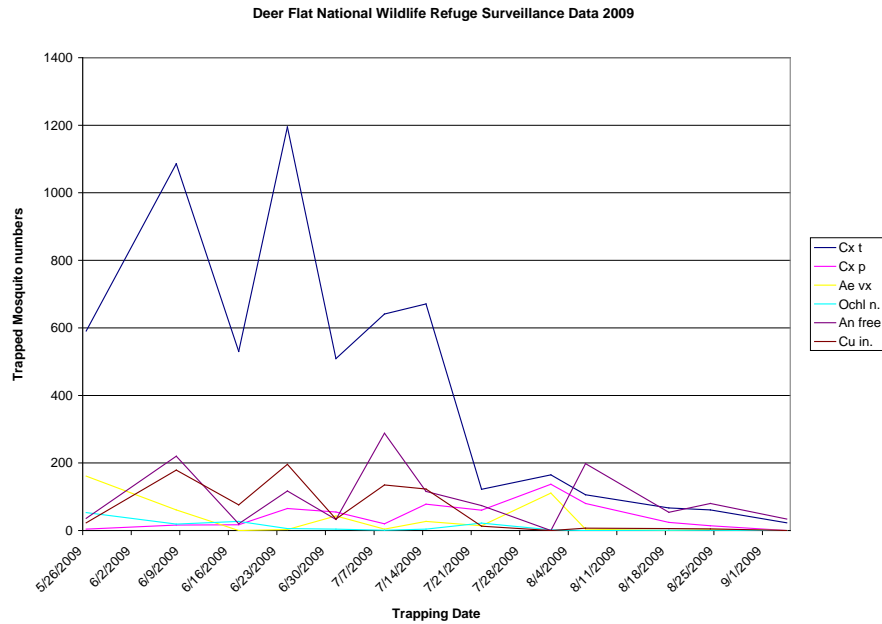


Figure 1: *Culex tarsalis* surveillance population data represented by BLUE line  
*Culex pipiens* surveillance population data represented by PINK line.

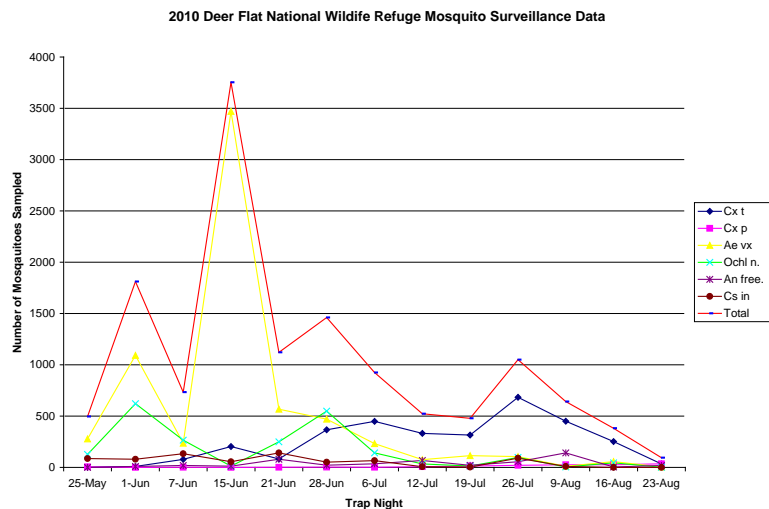


Figure 2: *Culex tarsalis* surveillance population data represented by BLUE line.  
*Culex pipiens* surveillance population data represented by PINK line.

Note that Flood Water species (*Aedes vexans*) peaked in Mid June in 2010 (Yellow line)

## CCMAD Integrated Pest Management Principles (I.P.M) for DFNWR

I.P.M is a decision making process that uses all available pest management strategies. This process will help determine what method of control will reduce the mosquito populations to an acceptable level with the least impact to the environment. I.P.M. methods will also weigh the health risk to exposure to pesticides versus the health risk of an arbovirus.

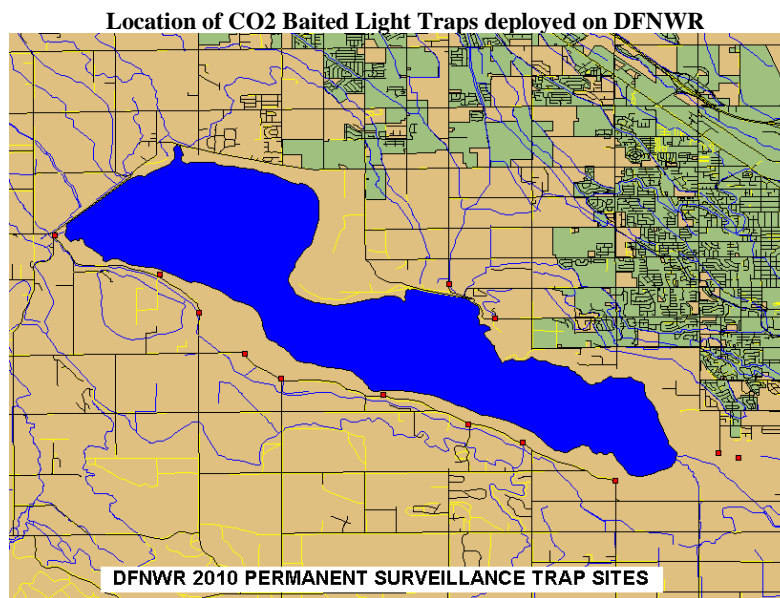
CCMAD-I.P.M. will identify the following strategies for management of mosquito populations: (IPM strategies are outlined in the **Appendix** of this document)

- Education.
- Cultural.
- Mechanical.
- Biological.
- Pesticide use.
- Surveillance.
- Action Thresholds.

### Adult Mosquito Monitoring and Surveillance

DFNWR is part of the Lake Lowell Control Sector of CCMAD and is the main source of mosquito populations for this Sector. Mosquito surveillance is conducted for the following reasons:

1. Adult mosquito population dynamics.
2. Species identification.
3. Presence of a mosquito borne disease.
4. Determining Action Thresholds.



## Arbovirus Testing

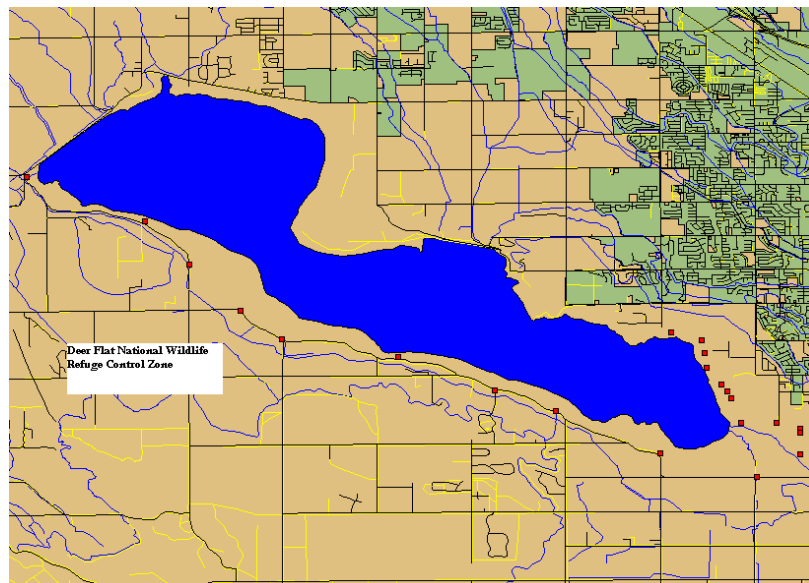
The Mosquito specimens trapped are frozen and identified by species and cataloged. Mosquitoes prepared for testing are divided into testing pools of 50 and tested for West Nile Virus using the R.A.M.P. (Rapid Analytical Measurement Platform) system. The R.A.M.P. system allows for accurate and immediate field testing for West Nile Virus and allows for timely management decisions. Positive mosquito pools are communicated with the Idaho Department of Health and Welfare Bureau of Laboratories. Management decisions to determine action threshold levels are determined by a calculated minimum infection rate of West Nile Virus tested mosquitoes. A calculated M.I.R (minimum infection) is determined by the use of the following formula:

$$\frac{\text{Total \# of positive tested pools}}{\text{Total \# of mosquitoes trapped}} \times 1000 = \text{M.I.R}$$

As defined by the Center for Disease Control, a calculated M.I.R of 5 mosquitoes / 1000 may indicate epidemic levels. The M.I.R ratio of 5/1000 is used by Idaho Public Health Officials as a bench mark number to take emergency action such as region wide aerial adulticide treatments.

## Mosquito Larvae Monitoring and Inspection

A two person inspection team is assigned to DFNWR to monitor mosquito population densities. Inspections are conducted on a daily basis starting in late March or early April, depending on spring time weather conditions. Inspection start points are defined in **RED** on the DFNWR map below:



## Pesticide Use and Action Level Thresholds

To determine pesticide use on DFNWR larval surveillance is first conducted. Larval surveillance locations are noted on the included maps with this document.

Larval Control Action Thresholds: Thresholds are determined by standard mosquito dipping techniques. Dipping is done in open water, along banks, under vegetation, flooded areas, standing water pools that are shallow, catch basins and shoreline habitat.

Density determinations for Culex species (primary disease vectors):

Low: 1-5 larvae per dip.

Medium: 6-10 larvae per dip.

High: > than 10 larvae per dip.

The larvae density action level can be used to determine low much larval control products are to be used or even if any action is to be taken. The following is the Action Level Threshold that CCMAD takes on DFNWR:

Low population density: **No action taken.**

Medium population density: Use 5-7 lbs. per acre of Bti.

High population density: Use 7-10 lbs. per acre of Bti.

Pesticides Used: Currently only biological control agents are used on DFNWR with the active ingredient Bacillus thuringiensis israelensis and Bacillus sphaericus\* are used.

Bti Agents used:

- Vectobac 12 AS aqueous suspension. EPA reg. no 73049-38
- Vectobac CG granular formulation. EPA reg. no. 73049-19
- Tecknar CG granular formulation. EPA reg. no. 73049-403
- Aquabac xt aqueous suspension. EPA reg. no. 62637-1
- VectMax CG granular formulation. EPA reg. no. 73049-429\*

Pesticide Methods of Application:

1. Bti liquid products are applied by backpack sprayer or hydraulic power spray equipment if large areas are treated.
2. Bti granular products are applied by hand granular spreaders and backpack power blowers. In most cases large acreage areas are treated with fixed wing aircraft.
3. Before aerial applications are conducted CCMAD will notify DFNWR Refuge Manager with action threshold data and map location of proposed aerial application.

4. Treatment site will be posted 24 hours before aerial application is made with the following information: When feasible applications will be scheduled for early morning at sunrise.
- Date and approximate time of application.
  - Pesticide used.
  - Contact Phone Number of CCMAD for any questions.
  - Method of Application: example: Low Flying Aircraft dropping granular product.

Below is the record of aerial larvicide treatments on DFNWR that occurred in 2010:

**Aerial Bacillus thuringiensis israelensis (Bti)  
Application Record  
Deer Flat National Wildlife Refuge  
2010**

Date	Location	Rate/Acre	Acres treated	Product Used	Amount Used
April 26	Gott's Point to inflow N.Y. Canal	8 lbs.	200	Teknar CG	1600 lbs.
May 3	Access 8 to Access 3	8.5 lbs	110	Teknar CG	935 lbs.
May 10	Gott's Point to Tio Lane Access and East Refuge Marsh	8 lbs.	250	Teknar CG	2000 lbs.
May 24	Gott's Point to Tio Lane Access and East Refuge Marsh	8 lbs.	200	Teknar CG	1600 lbs.
June 2	Access 6 to Access 1	8 lbs.	200	Teknar CG	1600 lbs.
June 14	Access 7 to Access 1	8 lbs.	200	Teknar CG	1600 lbs.
*June 11	East Refuge Marsh off Tio Lane Access	7 lbs.	60	VectoMax CG	420 lbs.
June 28	Access 6 to Access 1	8 lbs.	200	Vectobac CG	1600 lbs.
July 19	Gott's Point to Tio Lane Access	8 lbs.	200	Vectobac CG	1600 lbs.
August 9	Access 4 to N.Y. Canal inflow	8 lbs.	200	Vectobac CG	1600 lbs.
Totals			1820		14555 lbs.

**Trial application of VectoMax CG (Bti/Bs) Bacillus thuringiensis/Bacillus sphaericus**

Teknar CG (Bti): EPA Reg. No. 73049-43  
 Vectobac CG (Bti): EPA Reg. No. 73049-19  
 VectoMax CG (Bti): EPA Reg. No. 73049-429

Adulticide applications:

**At the present time there are no immediate plans to use adulticide materials on DFNWR. To review adulticide application methods and pesticide used refer to CCMAD Comprehensive Mosquito Management Plan submitted with this document.**

CCMAD currently uses one class of mosquito adulticide material on private property adjacent to DFNWR to control adult mosquito populations:

- Permethrin ULV, brand names: BioMist 4+4 EPA Reg. No. 8329-35  
Kontrol 4-4 EPA Reg. No. 53883-118

## **Non Target Organism Monitoring**

CCMAD will monitor the affects of larvicide operations on non target organisms starting 24 hours after any applications are made. Documentation of non target organism activity will be conducted by CCMAD inspection personnel.

- Any affects to bird populations in target area.
- Aquatic insects
- Fish species.

## **Contingency Emergency Mosquito Adulticide Plan**

When M.I.R. numbers reach epidemic levels, CCMAD will submit an emergency adulticide use plan. Any consideration of adulticide materials will be to reduce the infection rate of vector born species such as Culex species for West Nile Virus.

This use plan will involve the use of truck mounted U.L.V. equipment to apply a targeted adulticide application to areas that have elevated M.I.R of 5/1000 and elevated Culex species numbers. This plan will occur over a short period of time (one or two nights). Mosquito population will be monitored and again tested for disease presence. Materials to be used will be from the above list. The total acreage to be treated will be of that that is accessible by ground equipment and not to exceed 1,185 acres. (This figure was computed by mileage measurements of access roads and multiplied by a 300 ft. swath U.L.V. delivery swath.) Emergency adulticide applications will be **considered** when threat levels dictate the need to consider this action

## **Health Threat Determinations**

The following agencies are involved with determining a Health Threat emergency in Canyon County:

1. The Board of County Commissioners. Amended Idaho Statutes (2007) 39-2812 p.1 states that the Board of County Commissioners is authorized to declare a pest or vermin a “Public Health Threat”. In 2008 Canyon County was in the second year of a declared emergency by the Board of County Commissioners. This Public Health threat created the Canyon Interim Mosquito District for areas that were not under the jurisdiction of the Canyon County Mosquito Abatement District. An election in November 2008 made the interim district permanent and has merged with CCMAD to create a county wide mosquito control program.
2. Mosquito Abatement Districts. Through field data and mosquito populations monitoring, Canyon County Mosquito Abatement District plays an important role in Health Threat determinations. CCMAD communicates its’ field findings with the Idaho State Department of Health and Welfare and Central District Health Department.

3. Idaho State Department of Health and Welfare. The Bureau of Laboratories may be charged with confirmation of positive mosquito testing pools. The BOL mostly relies on field testing data from Mosquito Abatement Districts.
4. Southwest District Health. The primary responsibility of Southwest District Health is to monitor the disease outbreak potential and disseminate information to the public the potential risks of a mosquito borne disease outbreak and preventative measure to take.

#### Arbovirus History of DFNWR:

In 1999 cattle on ranch property that is adjacent to the southern boundary of DFNWR on Lakeshore Dr. tested positive for Western Equine Encephalitis. In 2006 mosquitoes testing positive for West Nile Virus were discovered early in June. The first confirmed *Culex tarsalis* pools occurred on June 6 followed by positive pool discovery dates of June 14, 20, 28, July 11, 17, 24, August 15 and 22. In total in 2006 there were 22 positive West Nile Virus pools located on DFNWR Lake Lowell Sector. This was over ½ of the total for the County in the epidemic year of 2006. The total cumulative Minimum Infection Rate for DFNWR (M.I.R.) was 12.04/1000. As mentioned earlier in this report the bench mark for taking emergency action is the ratio of 5 infected mosquitoes/1000. In 2007 there were no positive West Nile Virus mosquitoes pools detected on DFNWR. County wide there were however thirty positive pools detected. In 2008 there was no positive West Nile Virus mosquito activity detected from CCMAD surveillance on Deer Flat National Wildlife Refuge. In 2009, West Nile Virus was detected on 5 sites with 5 infected traps. The M.I.R. in 2009 never approached the 5/1000 bench mark. There was no arbovirus activity noted on DFNWR in 2010

#### Arbovirus vector mosquito species detected: (permanent water species)

Three primary vectors for West Nile Virus and Western Equine Encephalitis have been identified on DFNWR.

- *Culex tarsalis*: Common name- Western Encephalitis Mosquito. This species made up over 90% of the primary West Nile Virus vector species.
- *Culex pipiens*: Common name-Northern House Mosquito. Of lesser importance but a very efficient transmitter of West Nile Virus.
- *Culex erythrothorax*: Common name-Tulle Mosquito. Populations of this mosquito fluctuate greatly from year to year. It is an efficient transmitter of West Nile Virus especially in bird populations.

### **Mosquito Borne Threat Level Matrix**

The State of Idaho in 2007 Revised West Nile Virus Phased Response Guidance for Counties has defined five levels of response which is defined below:

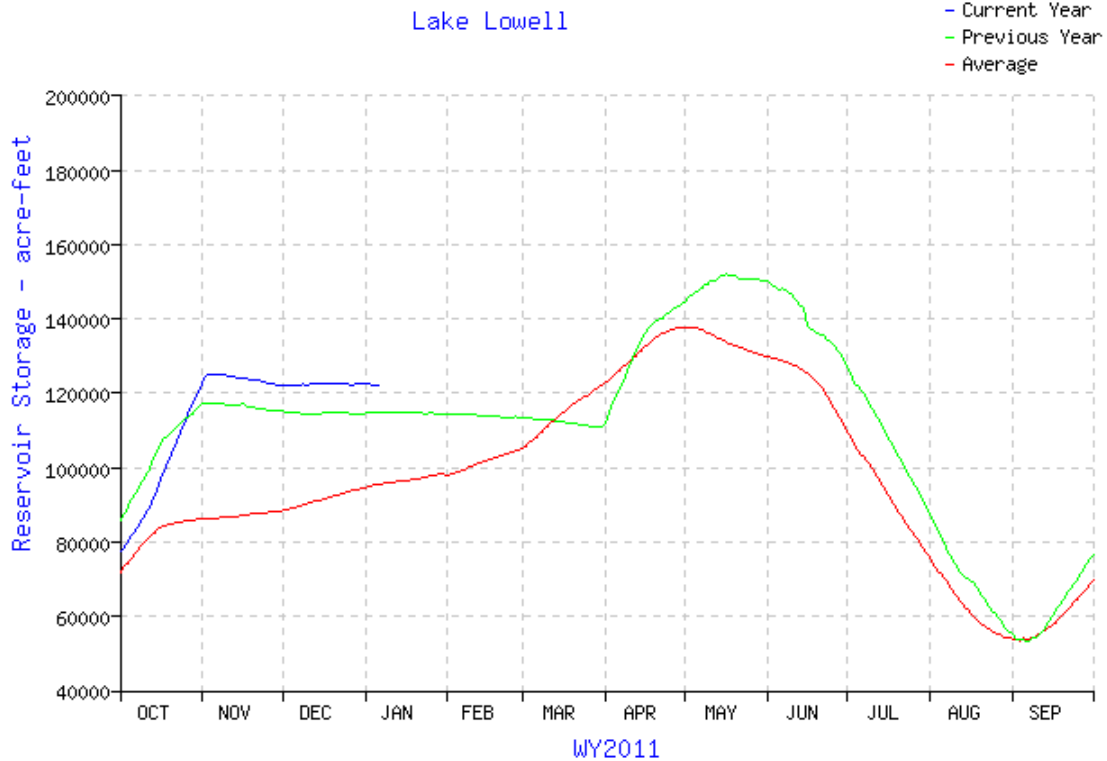
- **Response Level 1: Beginning of Mosquito Season (surveillance traps are deployed. Probability of human infection: Remote**
- **Response Level 2: Probability of human infection: Low**
- **Response Level 3: Probability of human infection: Moderate to High**

- **Response Level 4: Probability of human infection: Outbreak in progress.**
- **Response Level 5: In decline.**

Details of the Public Health Response Levels are included in the **Appendix** of this document

### Arbovirus Activity Forecast for 2011

- **Lake Lowell Water Levels:** If there is a warm spring, then conditions will be right for a spike in *Culex tarsalis* population level.



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**Blue line:** represents current water level  
**Green line:** Last year water level.  
**Red line:** Average

CCMAD will begin active mosquito larvae populations in March as weather permits and DFNWR approval of this plan.

Respectfully submitted,

Ed Burnett,  
 Canyon County Mosquito Abatement District Director

