

Integrated Pest Management (IPM)

Utah County Mosquito Abatement subscribe to an integrated pest management plan for mosquito control. That is, a wide variety of tactics are used to reduce populations of mosquitoes with minimal risk to the environment. This approach involves several components.

- **Identification of the mosquito species and understand its biology**
Though most adult mosquitoes are annoying, painful and even health threatening all mosquitoes do not pose the same threat. Our Vector Control inspectors, sample mosquitoes as larvae and adults. They are returned to the lab for identification. Mosquitoes that are potential health risks, aggressive biters, and near densely populated areas receive top priority. Categorizing them as key pests or occasional pests is made at that time. Since life cycles vary greatly (see Mosquito Life Cycle), this is a critical component of IPM.



- **Monitoring mosquitoes**
Each of the 13 mosquito districts are monitored weekly by inspectors. In addition, each Monday, beginning in June, 15 CDC mosquito traps are set out weekly throughout the county to see which species are flying. Additional traps are set later in the week to monitor potential air spray habitat in inaccessible areas near Utah Lake. The result of this monitoring determines if treatment is needed and/or the type of treatment prescribed.



Economic and action thresholds for mosquitoes

Larvicide chemicals for mosquito control are very expensive ranging from \$2-\$6/lb which translates to \$10-\$40 an acre. If few mosquitoes, 1-5/dipper, are encountered that are a nuisance species, economically, the inspector may elect to not treat that area. If that species is a serious health threat and produces several broods of mosquitoes throughout the year, this would be an ideal treatment time even with low numbers.

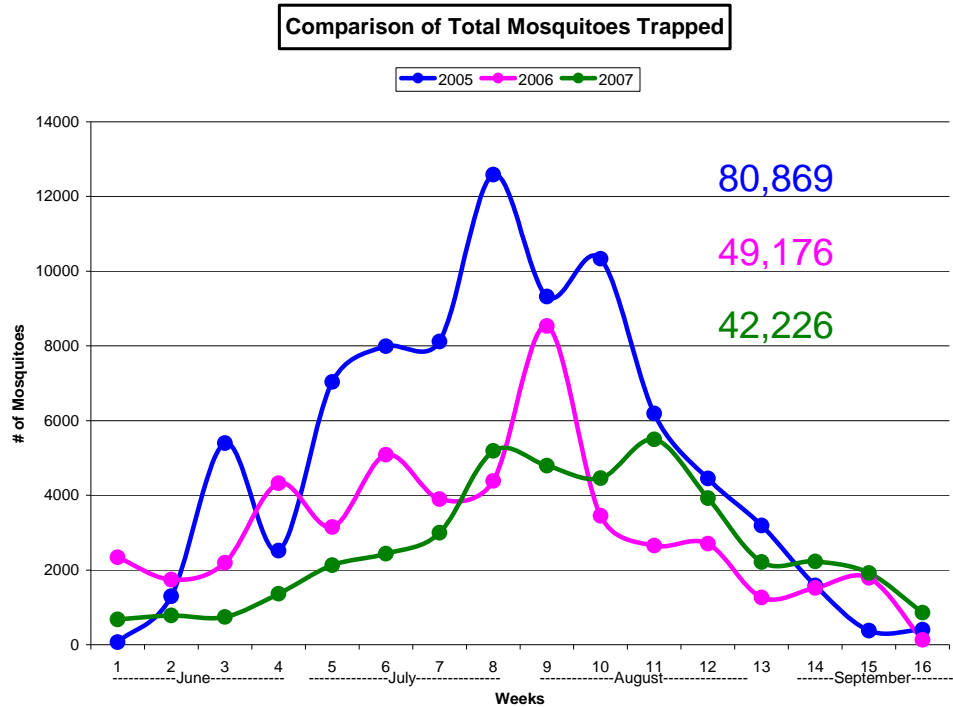
The major mosquito species that serves as a vector for WNV in Utah County is *Culex tarsalis*. When this species reaches 1000-2000 in our weekly traps we begin to increase our ULV spraying in the evening which targets the most active period for this species. This historically is the last part of June/ early July. If mosquitoes test positive for WNV this heightens human health risk and we increase ULV spraying as well as alert our pilots for potential larger air spray coverage. If positive mosquito pools (10-50 vector mosquitoes) reach a Minimal Infection Rate (MIR) of 4%, determined by # of positive pools/ total pools submitted X 1000, there is a serious human health risk and maximum control methods are used to reduce mosquitoes.

Following is a data table for a target mosquito species critical for human health.

Cx. tarsalis Weekly CO2 Totals by Trap Location 2007

Trap Location	4-Jun	11-Jun	18-Jun	25-Jun	2-Jul	9-Jul	16-Jul	23-Jul	30-Jul	6-Aug	13-Aug	20-Aug
1. Willow Park, Lehi	6	1	3	0	10	39	119	86	102	168	105	43
2. Loch Lomond	2	20	142	187	172	182	102	22	27	150	10	59
3. AF Boat harbor	3	0	2	0	20	48	5	4	5	2	3	13
4. Pleasant Grove	0	1	8	2	2	6	7	11	15	39	37	15
5. Orem, St. Road	17	18	96	89	187	199	82	209	225	117	306	109
6. Foot Printer, Provo	9	4	11	6	6	28	104	77	337	523	76	73
7. Provo Bay	3	5	12	9	20	97	23	279	451	200	341	139
8. Ironton (S Provo)	2	1	2	9	22	25	32	6	123	0	8	12
9. Camalot, Spr. ville	7	11	28	17	164	12	335	35	194	280	70	58
10. Wild Wings	4	59	60	250	76	32	667	236	419	706	165	245
11. Vet Clinic, Sp Fk	2	21	9	137	52	400	559	1117	31	441	20	176
12. Benjamin	1	5	21	107	64	162	107	133	96	127	40	16
13. Payson, W Mt Rd	0	0	3	21	0	66	27	5	49	36	18	62
14. Genola	11	6	10	4	25	42	63	29	26	16	14	26
15. Goshen Reservoir	18	143	62	106	10	234	49	183	289	443	170	59
Totals	85	295	469	944	830	1572	2281	2432	2389	3248	1383	1105

This monitoring allows us to see precisely when the best the best time to implement control efforts for a particular species. Note in the graph that follows a comparison of total mosquitoes for the past three years derived from our weekly traps. Dramatic increase in numbers usually occurs towards the end of June as temperatures are getting hot.



- **Develop a Pest Management Goal**
 Using the data gained from surveillance efforts determination is made of what needs to be done. It may involve no action if there is minimal impact. Prevention and removal of small and temporary mosquito breeding sources could be the goal. Suppression by identifying the mosquito source is always a primary goal and then to reduce the mosquito to an acceptable level.
 - This may include plans for the use of larval growth inhibitors added to water
 - Biological bacterial spores selective for certain mosquito larvae
 - Addition of monomolecular film to inhibit larval & pupa respiration
 - Predatory fish as Western Mosquito fish, *Gambusia affinis* and Lesser Chub, *Iotichthys phlegethontis* have been used but are not currently used by Utah County MAD
 - Mosquito adulticides delivered by ULV sprayers or air plane

- **Implement Program and Evaluation**
 Following these steps, a method is selected making sure that if chemicals are used labels are followed and daily records are kept. These results are evaluated from inspectors and trapping each week by management to determine the effectiveness of the plan. Adjustments are made as needed.