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 12 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 encounter 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 CO_2 Totals by Trap Location 2011**

Trap	Location	25-May-11	31-May-11	6-Jun-11	13-Jun-11	20-Jun-11	27-Jun-11	5-Jul-11	11-Jul-11	18-Jul-11	26-Jul-11	1-Aug-11	8-Aug-11	15-Aug-11
1	Willow Park			2	3	2	12	38	105	177	288	141	155	36
2	Loch Lomond			2	8	11	91	88	253	311	116	236	87	171
3	AF Boat Harbor			1	9	3	60	194	350	467	37	161	101	91
4	Pleasant Grove						2	9	46	73	31	47	33	19
5	St. Road Shop		4	9	39	9	69	865	692	2,206	914	462	1,092	672
6	Foot Printer Park		1	4	8	17	103	355	756	454	355	490	501	236
7	Provo Bay	2	3	19	9	8	407	264	955	803	1,028	603	2,031	477
8	Ironton		30	28	10	6	48	81	127	127	145	119	279	166
9	Camalot		2	10	2	16	150	786	738	1,108	396	1,551	1,075	692
10	Wild Wings	3	12	25		104	229	1,601	1,018	6,345	1,541	491	1,436	689
11	Vet Clinic		7	4	51	8	11	522	387	218	344	991	904	333
12	Gut Plant (Lewis)		1		3	1	19	0	138	77	33	902	226	11
13	West Mtn. Road			2	1		3	25	54	198	189	311	478	430
14	Genola (Oberg)		2		4	6	6	57	118	308	156	221	367	199
15	Goshen Dam		2	24	20	12	24	33	73	144	365	660	1,233	338
	Totals	5	64	130	167	203	1,234	4,918	5,810	12,061	5,938	7,386	9,998	4,560

Total Weekly Mosquitos Captured in 15 CO2 Traps

DATE	2003	2004	2005	2006	2007	2008	2009	2010	2011
1 wk June	183	2,349	72	2,343	677	392	1,002	276	461
2 wk June	517	1,678	1,300	1,745	783	482	709	664	755
3 wk June	126	2,586	5,397	2,193	742	1,056	1,001	432	1,344
4 wk June	7,877	2,397	2,517	4,325	1,367	483	1,544	879	3,054
5 wk June	4,389	5,337	7,033	3,149	2,130	1,205	4,773	587	11,157
1 wk July	3,666	5,145	7,989	5,089	2,436	3,126	4,467	630	12,938
2 wk July	10,977	8,267	8,116	3,898	3,001	1,686	2,446	920	26,458
3 wk July	6,399	3,289	12,586	4,387	5,188	2,856	3,681	2,257	20,589
4 wk July	4,129	2,394	9,321	8,530	4,794	4,036	5,437	1,621	32,998
1 wk Aug	2,610	1,304	10,331	3,455	4,460	9,675	3,628	2,087	32,695
2 wk Aug	3,212	918	6,191	2,654	5,498	4,995	3,009	2,847	20,091
3 wk Aug	8,453	2,270	4,453	2,706	3,926	5,197	2,377	3,003	13,928
4 wk Aug	3,692	1,425	3,189	1,263	2,215	3,026	1,523	1,779	19,267
1 wk Sept	1,858	1,178	1,589	1,521	2,228	680	1,568	2,173	8,592
2 wk Sept	2,776	710	379	1,789	1,920	2,335	961	2,900	4,359
3 wk Sept	880	10	406	129	861	729	1,344	1,070	2,624
Totals	**61,744**	**41,257**	**80,869**	**49,176**	**42,226**	**41,959**	**39,470**	**24,125**	**211,310**

- **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.