

MENDOCINO PARTNERSHIP FOR THE PRECAUTIONARY PRINCIPLE

The precautionary principle was passed as a Mendocino County Administrative Policy by the Board of Supervisors on June 27, 2006. It is a tool to help the County make decisions that will have the best long term effect on the health, well being and environment of Mendocino County. Public participation is a key component of precautionary decision making.

Pilot Project: Mosquito Control as a Prevention Against West Nile Virus

West Nile Virus is spread through the bite of infected mosquitoes. In an effort to control mosquito population the Mendocino County Division of Environmental Health (DEH) has implemented mosquito larval controls. DEH currently utilizes mosquito fish, *Bacillus thuringiensis*, *Bacillus sphaericus*, and methoprene as larval control that is applied to standing water.

DEH invites your input in evaluating the various larval controls, and assessing possible alternatives or best practices in their application.

2007 Summary of West Nile Virus Activity in California

- ❖ 378 human cases of WNV have been reported.
- ❖ The median age of all cases is 55 years (range: 2 – 96 years).
- ❖ 16 WNV related fatalities have been reported.
- ❖ 28 horses from 14 counties tested positive for WNV, of which 14 were euthanized or died.
- ❖ 1,394 dead birds from 50 counties tested positive for WNV.

Mendocino County had two reported human cases of WNV and three dead birds test positive in 2007. The county with the most reported WNV activity is Kern County with 138 human cases and 124 birds testing positive, followed by Los Angeles County with 37 human cases and 160 birds testing positive.

Nationally, a total of 3,404 human cases of WNV have been reported in 2007 with a total of 98 fatalities. Colorado is the most active state with 555 human cases followed by California with 378 human cases.

Larval Control Fact Sheet

Mosquitofish

Active ingredient: Live bearing fish classified as *Gambusia affinis*. Fish are usually small (less than two and a half inches in length).

Environmental impact:

Mosquitofish will compete for food with other larvae eating fish if applied to streams or watersheds. Long-term effect on native fish populations is unknown.

Target species specificity:

Mosquitofish are opportunistic omnivores. They feed on plants, worms, crustaceans, insect larvae, snails, and other vertebrates including their own young.

How it works:

Mosquitofish consume mosquito larvae during the warm summer months when mosquito activity is the highest. Warmer water temperatures cause the mosquitofish to be more active, consume more larvae and reproduce at a faster rate. Fish populations will increase until food source becomes less abundant or water temperatures begin to decrease.

Decreasing water temperatures cause fish to slow down, with little to no feeding and breeding activity. Fish that survive the winter will continue the population again in the summer.

How long it lasts in the environment:

Mosquitofish are an extremely hardy species of fish. Larger fish will prey on mosquito fish, but with little or no predation mosquitofish may be established in the ecosystem for many years, depending on water quality and food.

Pros for the use of mosquitofish:

- Mosquitofish are an alternative to pesticides.
- Mosquitofish are organic, and their impact on water quality is similar to native species.
- Given proper conditions, mosquitofish populations will continue in the ecosystem and will not require re-application for mosquito control.
- Can be applied by anyone.
- Effective against mosquito larvae.

Cons against the use Mosquitofish

- Non-native fish.
- Mosquitofish will only be applied to contained water systems due to their competition with native species for food.
- Long-term effects on native species if mosquitofish are applied to open water systems is unknown
- Mosquitofish will consume and reduce non-target species.
- Requires more fiscal resources by the county to maintain them and make them available to the public.

Bacillus thuringiensis

Active ingredient: *Bacillus thuringiensis israelensis* (*Bti*)

Environmental impact:

Minimal impact. *Bti* is unlikely to contaminate ground water when appropriately applied. Practically nontoxic to birds and fish

Target species specificity:

The bacterium produces a toxin. The toxin is highly insoluble in normal conditions so it is safe for humans, higher animals, and most insects. However it is soluble in the stomach of mosquito larvae.

How it works:

Mosquito larvae eat the *Bti*. The bacterium produces a toxin in the stomach of the mosquito, but not in mammals. The toxin kills the larvae.

How long it lasts in the environment:

Bti degrades rapidly on plant surfaces. It is moderately persistent in soil. The toxin degrades rapidly.

Pros for the use of *Bti*:

- Works quickly against larvae
- Certified for Organic use
- Very low toxicity
- Approved for agricultural ponds

Cons against the use of *Bti*:

- Only works against mosquito larvae, not other life stages of the mosquito.

Bacillus sphaericus

Active ingredient: *Bacillus sphaericus*

Environmental impact:

Minimal impact. *Bs* is unlikely to contaminate ground water when appropriately applied. Practically nontoxic to birds and fish, designed for non crop water sources.

Target species specificity:

The bacterium produces a toxin. The toxin is highly insoluble in normal conditions so it is safe for humans, higher animals, and most insects. However it is soluble in the stomach of mosquito larvae.

How it works:

Mosquito larvae eat the *Bs*. The bacterium produces a toxin in the stomach of the mosquito, but not in mammals. The toxin kills the larvae.

How long it lasts in the environment:

Bs degrades rapidly on plant surfaces. It is moderately persistent in soil. The toxin degrades rapidly.

Pros for the use of *Bs*:

- Certified for Organic use
- Works quickly against mosquito larvae
- Low toxicity

Cons against the use of *Bs*:

- Only works against mosquito larvae, not other life stages of the mosquito.
- Not approved to use around agricultural ponds.

Methoprene

Active ingredient : S-Methorpene

Environmental impact:

Methoprene is toxic to a range of insects. It has been used in the field against a number of pests such as mosquitoes, biting flies, hornflies, ants, and termites. The lethal dose required to kill mosquitoes is generally around 1 part per billion.

How it works:

Methoprene disrupts the development of the insect and so causes death or reproductive failure at a specific time in the mosquito life-cycle, usually not the stage treated. Treated larvae rarely die as larvae and are more likely to die as adults or during pupation. For example, mosquito larvae are the target stage for methoprene, but its effect is to reduce adult emergence.

How long it lasts in the environment:

Half-life of methoprene under controlled conditions in soil and water is around 1-2 days. However, under field conditions and protected from UV, activity against a number of pests including mosquitoes has continued for 100 days . In general, methoprene degrades rapidly in sunlight, in water and on inert surfaces. It breaks down rapidly in soil and does not leach. The literature shows some variability in the reported persistence of methoprene in the environment. Duration of persistence is also determined by the initial rate of application. Formulation can extend activity beyond one year in some circumstances and a number of sustained-release formulations (briquettes, pellets, boluses) have shown such prolonged activity.

Pros for the use of Methoprene:

- Most effective larvicide (more effective than *Bt*)
- Easily degradable in the environment
- Kills many different types of mosquitoes
- Can be applied to dry reservoirs that may later fill with water and become mosquito habitat.

Cons against the use of Methoprene:

- Public stigma against chemicals
- Non target toxicity kills other water breeding insects as well as mosquitoes
- Slightly toxic to fish

Additional information can be found at the following web sites:

www.springerlink.com/index/f17r17gju1231kg6.pdf

<http://npic.orst.edu/factsheets/BTtech.pdf>

<http://extoxnet.orst.edu/pips/methopre.htm>

The public comment period will close on February 22, 2008. Please submit your comments to:

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