

Multnomah County Health Department

MOSQUITO CONTROL IN OREGON

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MISSION

Primary

- Mosquitoes
- Rodents
- Dust Mites

Secondary

- Bed Bugs
- Spiders of medical importance
- Cockroaches
- Other

WHO IS RESPONSIBLE?

- Different agencies providing vector services; (17 counties)
 - Vector district (15)
 - Health department or health district (5)
- Multiple agencies responding in one community
- Statewide coverage does not exist
- Minimal state infrastructure and resources to support



AUTHORITY

- Oregon Revised Statute 452 (2007)
<http://www.leg.state.or.us/ors/452.html>
- Various municipal titles and codes


MOSQUITO DIVERSITY

North America
170 species

Northwest
53 species

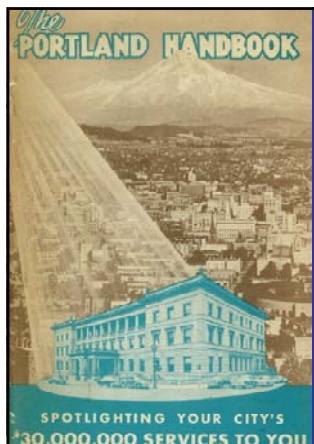
Multnomah Co.
25 species (includes 2 imported)

33% (7) are of public health concern!



MOSQUITO-BORNE DISEASE IN OREGON

- Malaria outbreaks 1930's -1950's
Willamette Valley
- Western Equine Encephalitis
- St. Louis Encephalitis - *Jackson County & Union County*
- West Nile virus



Portland Handbook

Quality of Life

In 1953

“mosquitoes made life unhappy in parts of Portland for picnickers and sharply decreased milk production by dairy herds”

SPOTLIGHTING YOUR CITY'S 30,000,000 SERVICES TO YOU

MANAGEMENT; NOT ELIMINATION

- Mosquito eradication is **NOT** the goal
 - NOT possible
 - Ecologically undesirable impacts
- **Goal:** Suppress mosquitoes to minimize human health impact of mosquito-borne disease
- **Approach:** Integrated Pest Management (IPM)


IPM?

A multiple step approach

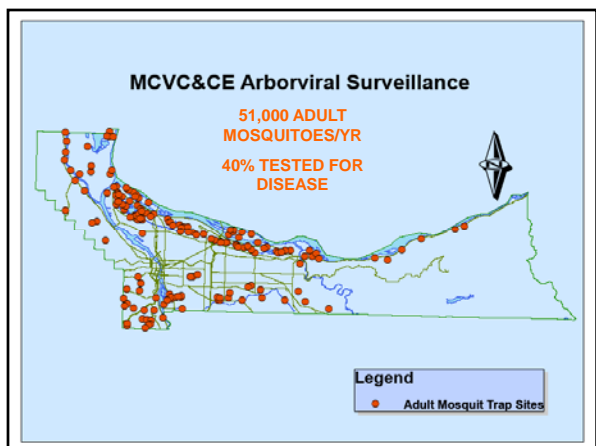
- Identification & Surveillance
- Education
- Evaluation
- Control
 - Biological
 - Biorational
 - Chemical
 - Source Reduction

Mosquito Surveillance

- Presence of mosquito-borne disease (e.g. WNV)
- Analysis of trends in population and species diversity
- Monitor local threshold
- Use of spatial technology (GIS/GPS)
- Immature and adult mosquitoes



larvae pupae adult

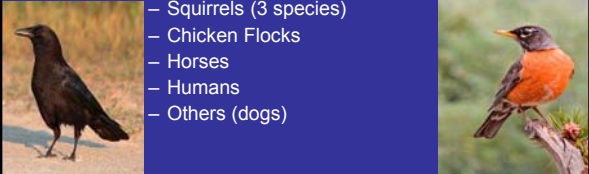
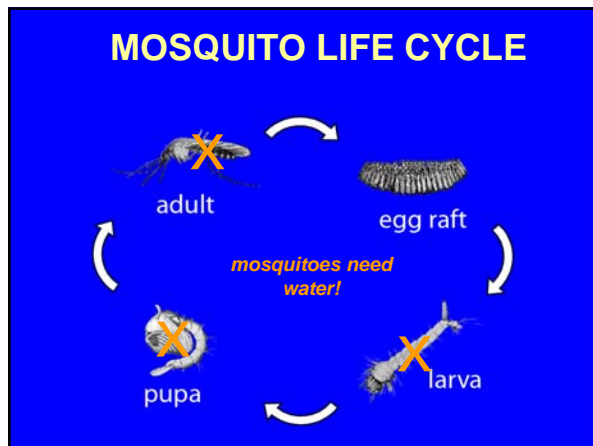


What Does Mosquito Surveillance Look Like?



Sentinel Surveillance

- Passive
- OSU, OPHL, and in-house
- Testing other organisms for presence of mosquito-borne disease:
 - Wild birds (corvids and American Robin)
 - Squirrels (3 species)
 - Chicken Flocks
 - Horses
 - Humans
 - Others (dogs)

WHAT CONTROL METHOD TO USE?

- Habitat reduction (L/P)
- Biological & Bacterium (L)
- Hormones (L/P)
- Films (L/P)
- Oils (L/P)
- Chemical insecticides (L/P/A)

- Does the mosquito population need to be suppressed?
- Assure intended control option affects life stage
- Environmental fate and habitat effects

HABITAT REDUCTION


- Some examples include:
 - Elimination of standing water
 - Water level manipulation (natural and constructed areas)
 - Vegetation management
 - Tire collection and disposal program
 - Land use planning

and many more.....

Wetland Management

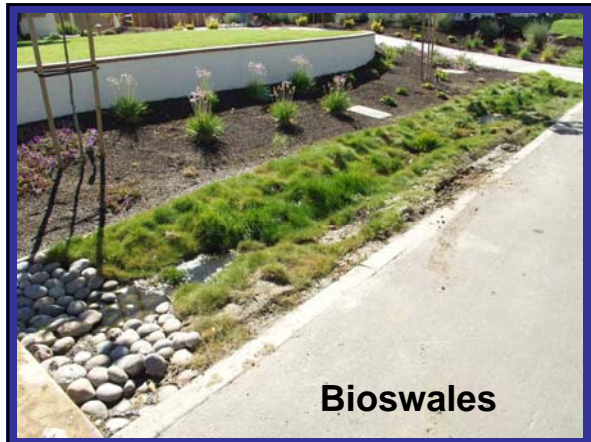


Debris Removal



Cemetery Urns




BIOLOGICAL

- Mosquito fish
 - Used on closed water systems only (e.g ponds)
 - By approval from State Fish and Wildlife
- Others but not effective in Oregon



BIORATIONAL

- Utilize bacteria to kill larvae
 - *Bacillus thuringiensis* var. *israelensis* or *Bti*
 - *B. sphaericus* or *Bs*

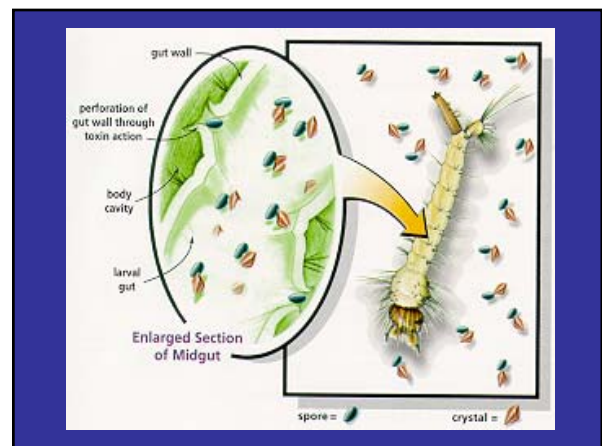


- Applied by hand and helicopters
- Specific in killing target species
- No direct effects on vertebrate non-targets
- Potential minimal indirect effects on some invertebrates

MODE OF ACTION

- 1) Bacteria produce a crystal
- 2) Larvae feed on crystals or the bacteria
- 3) Proteins in the crystals are activated by the enzymes and alkaline pH in the larval midgut
- 4) Activated proteins attack the gut lining.
- 5) Larvae can no longer digest food and die.

Bti – active up to 3 days
Bs - multiply in larval cadavers; up to 8 wks



APPLICATION METHODS



HORMONES - IGR

- Mimics natural “molting” hormone
- Prevents metamorphosis to adult
- Must contact prior 4th instar larvae
- Minimal non-target impacts
- Placement must be considered for environmental fate



FILMS AND OILS

- Physical control of immature mosquitoes

Prevent respiration

- No resistance issues
- Requires application finesse



CHEMICALS

- Used the least; but critical component to IPM
- Mostly synthetic pyrethroids; few organophosphates
- Most used for adult mosquito control
 - migration
 - knock-down
- Special case - non-feeding larvae
- Applied by ground or aerially, mostly flooded irrigation acreage
- Method used either ULTRA LOW VOLUME (ULV) or SPRAYER

REGULATION

- Oregon Dept. of Agriculture
- Fish & Wildlife (Federal & State) - ESA
- Oregon Health Division
- Environmental Protection Agency/DEQ
 - FIFRA, NPDES, CWA*
- NOAA - ESA

THE CLEANWATER ACT

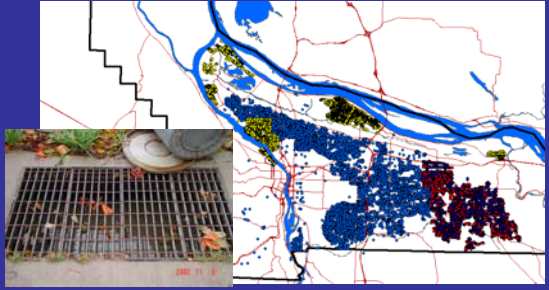
EPA regulates pesticides under FIFRA and has never required and NPDES permit for the use of pesticides

2001 – some federal courts ruled that some pesticide applications were a “pollutant discharge” and required a permit

2006 – EPA issues a Final Rule clarifying the relationship between CWA and FIFRA “mosquito control and some other aquatic uses are not a pollutant discharge”

2009 – 6th C. Court strikes down Final Rule
 2009 – 6th C. Court granted a two-yr stay on their decision (*exp. 4-2011*)
 2010 – numerous bills and committee are currently looking at various fixes to the problem.
 For more information, contact Beth Moore, EPA and review the draft permit
http://www.epa.gov/npdes/pubs/proposed_pgp.pdf

THE CLEANWATER ACT



Storm water structures – 130/mile²

CLIMATE CHANGE AND MOSQUITO BORNE DISEASE

"Climate change is already causing major public health disasters in Europe & Africa" – HEAL report 10-07

- Malaria increase by $\approx 22\%$ - Africa
- Chikungunya now found in Europe
- West Nile virus and Malaria increase deaths - Portugal

Pacific Northwest Climate Change Predictions

- Wetter winters; drier summers – multiple models
- Warmer winters west of Cascades

US Global Change Research Program - 2003

WEATHER/CLIMATE

- Expect an + summer mosquitoes and – snowmelt/ floodwater mosquitoes; + vector risk
- Increased reliance upon control tools that affect through feeding process
- With + water temperature; accelerated development mosquitoes
- Loss of cool-water predators (salmonids)
- Local transmission of mosquito-borne disease sooner – shift in host preference/avoidance
- Predict + endemic malaria mosquito populations overtime

MOVEMENT

- Travel, trade, global economy, etc.
- Exotics "accidentally" introduced
 - Lucky Bamboo & Asian Tiger Mosquito - 2001
 - Tires & *Oc. japonicus* in PNW - 2001 – current
- WNV genetics in US




INFORMATION

American Mosquito Control Association

<http://www.mosquito.org/>

Northwest Mosquito and Vector Control Association

AK, AB, BC, ID, MT, OR, SK, WA

<http://www.nwmvca.org/>

Oregon Mosquito and Vector Control Association

<http://www.omvca.org>

Multnomah County Vector Control

<http://www.mchealth.org/vector/index.shtml>

END