

# **A Preliminary Assessment of Vectors Associated with Stormwater Management Structures in the United States.**

## **A Nationwide Vector Control Perspective**

CALIFORNIA DEPARTMENT OF HEALTH SERVICES

VECTOR-BORNE DISEASE SECTION

Gray Davis  
Governor  
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Grantland Johnson, Secretary  
California Health and Human Services Agency



Diana M. Bontá, R.N., Dr.P.H., Director  
Department of Health Services

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## Summary

In 1998, the California Department of Health Services, Vector-Borne Disease Section (CDHS-VBDS) entered into a Memorandum of Understanding with the California Department of Transportation (Caltrans) to provide technical expertise regarding vector production and the potential of vector-borne diseases within its stormwater Best Management Practice (BMP) Retrofit Pilot Study. The purpose of the Caltrans BMP Retrofit Pilot Study is to evaluate the efficacy of various structures that were designed to improve the quality of stormwater runoff before being discharged into natural waterways and the ocean. A consequence of this effort could directly impact operations of vector control agencies and public health by increasing habitat availability for aquatic stages of disease vectors, and by creating harborage, food, and moisture for reservoir and nuisance species. It was the intent of the CDHS-VBDS / Caltrans agreement to document and, where possible, prevent vector production and harborage at the BMP study sites. The agreement required CDHS-VBDS to establish a comprehensive vector surveillance and monitoring study, provide vector abatement protocols, and recommend appropriate engineering modifications to BMP structures that would ultimately reduce their potential to produce or harbor vectors. It is anticipated that the outcome of this study will have significant implications on methods that may be mandated for the proper management of stormwater runoff.

Despite the abundance of documentary evidence on the positive attributes of BMPs as stormwater management devices, very little information is available on the vector problems associated with these structures. To establish a baseline evaluation, CDHS-VBDS prepared a detailed questionnaire to solicit information from vector control agencies with regard to their experiences and perspectives. The primary objective of the survey was to develop a better understanding of the vector problems associated with different stormwater management structures and the solutions used to correct them. On January 11, 2000, 338 surveys were mailed out to vector control agencies nationwide. Exactly 105 agencies participated in the study, of which 72 (69%) provided feedback on vectors associated with stormwater management structures. This report provides a preliminary assessment of the potential public health risks involved with the

construction of structures such as the Caltrans BMPs, addresses common problems with stormwater management structures that encourage vector production, and summarizes the views of vector control agencies on these issues.

## Introduction

The importance of managing stormwater runoff is well known among transportation and stormwater management agencies across the country. Federal and state laws regulating stormwater runoff have several purposes such as flood control, reduction of water pollution, and re-charge of underground aquifers. Stormwater systems serving these functions include retention and detention ponds, swales, ditches, channels, vaults, and other structural devices.

In recent years, water management strategies have fallen under increasingly stringent regulations requiring the implementation of what have been termed Best Management Practices (BMPs). In general, BMPs serve to reduce the adverse environmental impact of human activities through the improvement of existing stormwater management structures or by creating new ones. The acronym “BMP” has been used to describe a wide variety of “environmentally-friendly” management practices, including many that do not involve water. This has resulted in confusion among vector control personnel as to the exact definition of a Best Management Practice. When used in reference to stormwater management, BMPs may include schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to improve water quality. Stormwater BMPs may also refer to treatment requirements, operating procedures and techniques to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In general, the primary purpose of stormwater BMPs is to help prevent flood damage and erosion, preserve water quality and natural ecosystems, and provide usable waters for various human purposes.

In 1998, the California Department of Health Services, Vector-Borne Disease Section (CDHS-VBDS) entered into a Memorandum of Understanding (MOU) with the California Department of Transportation (Caltrans) to provide technical expertise regarding vector<sup>1</sup> production and the potential of vector-borne diseases within its stormwater BMP Retrofit Pilot Study. The purpose of the Caltrans BMP Retrofit Pilot

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<sup>1</sup> Vector is defined in Health & Safety Code Section 402.1 “Vector,” as used in this article, is defined as any animal capable of transmitting the causative agent of human disease or capable of producing human discomfort or injury, including but not limited to, mosquitoes, flies, other insects, ticks, mites, and rodents.

Study is to evaluate the efficacy of various structural designs retrofitted to selected facilities for improving the quality of stormwater runoff from freeways, interchanges, park and rides, and maintenance stations before being discharged into natural waterways. A consequence of this effort may directly impact operations of vector control agencies and public health by increasing habitat availability for aquatic stages of disease vectors, and by creating harborage, food, and moisture for reservoir and nuisance species. It was the intent of this agreement to benefit public health by documenting and, where possible, mitigating vector production and harborage at the BMP pilot project sites. The agreement required CDHS-VBDS to establish a comprehensive vector surveillance and monitoring study, provide vector abatement protocols, and recommend appropriate engineering modifications to Caltrans BMPs that would reduce the potential of these structures to produce or harbor vectors. In addition to reviewing the BMP design and operations data, the role of CDHS-VBDS is to conduct studies that will identify which of these designs are least conducive to vector production. It is anticipated that the outcome of this study will have significant implications on methods that may be mandated in the future for the management of stormwater runoff.

In accordance with the MOU, CDHS-VBDS staff established comprehensive vector surveillance and monitoring plans for all BMP Pilot Project study sites in Los Angeles (Caltrans district 7) and San Diego (Caltrans district 11) Counties. The plans outlined various activities to be conducted in collaboration with Greater Los Angeles County Vector Control District, San Gabriel Valley Mosquito and Vector Control District, Los Angeles County West Vector Control District, and San Diego County Vector Control Program. The primary tasks of the local vector control agencies are weekly monitoring of all BMP Pilot Project study sites for immature stages of mosquitoes, midges, and sand flies. At the same time, CDHS-VBDS staff maintains an independent surveillance schedule to monitor vegetative cover, predators of mosquito immatures, physical and chemical properties of water, and evidence of rodent and other vector populations. In addition, a single vector abatement regimen was prepared by CDHS-VBDS and implemented by the collaborating vector control agencies. After evaluation of various mosquito larvicides, a liquid formulation of the Insect Growth Regulator (IGR)

methoprene (Altosid EC<sup>®</sup>: a juvenile hormone mimic that inhibits successful emergence of adult mosquitoes and a variety of midges) was recommended because of its short residual activity and negligible effects on larval population dynamics. The local vector control agencies continue to implement this mosquito abatement procedure as needed.

## **Purpose and Objectives**

CDHS-VBDS prepared a qualitative and quantitative questionnaire entitled “Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey”. The primary purpose of this study was to develop a better understanding of the vector problems and solutions associated with different stormwater management structures from vector control agencies. However, it also provided opinions and attitudes of vector control personnel toward the construction of these structures and an indication of the abundance and distribution of BMP and BMP-like structures. The information obtained supports the concerns of CDHS-VBDS with regards to the potential public health risks associated with the construction of stormwater management structures. Common problems that encourage and/or increase the potential of stormwater management structures to breed vectors are addressed along with suggestions on how to reduce or eliminate them. This document should be used as a source of additional information to provide guidance to planners, engineers, landscape architects, and others involved with stormwater and non-point source pollution management.

The following report is based on information gathered from 105 CDHS-VBDS questionnaires completed by participating vector control agencies (Appendix E, available upon request). CDHS-VBDS carefully examined the responses to the survey questions and summarized the information into a single document. Emphasis was placed on common trends noted in response to certain questions or groups of questions. The conclusion discusses overall trends, attitudes, suggestions, and possible solutions to stormwater management issues gained from participating vector control agencies throughout the United States. Information contained herein is supported by CDHS-VBDS.

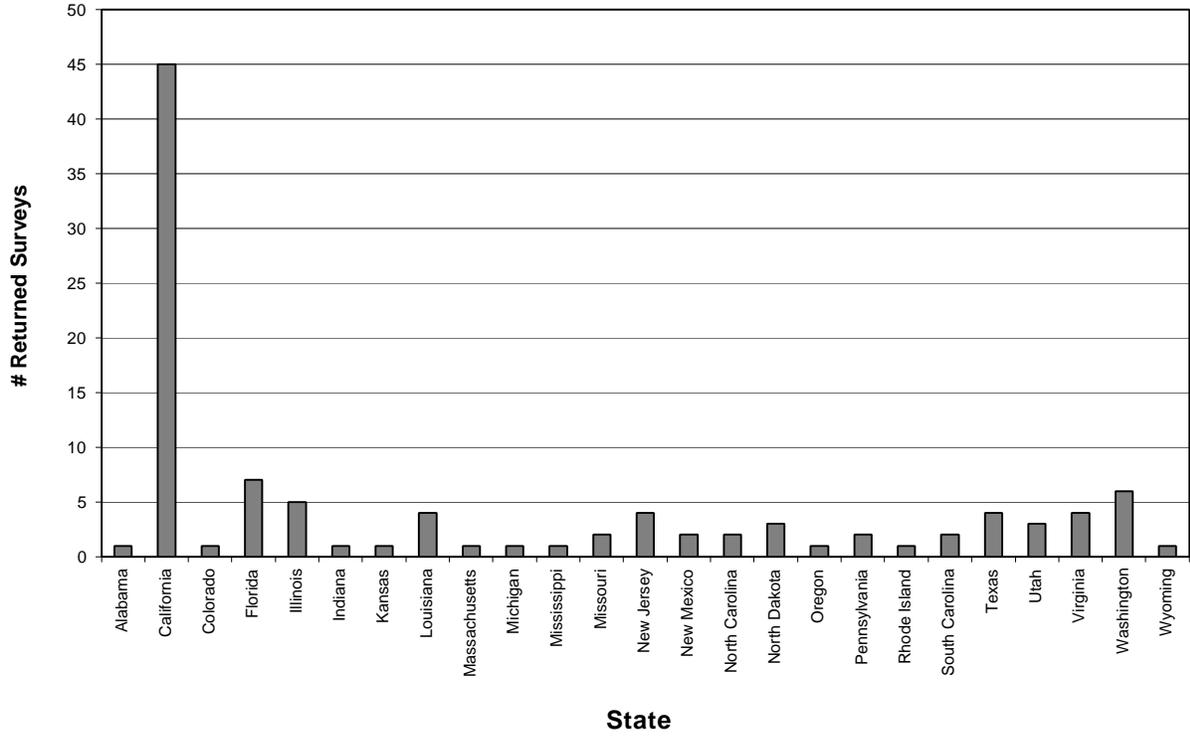
## Participating Agencies

In late 1999, CDHS–VBDS prepared a detailed questionnaire and assembled a list of agencies from current AMCA (American Mosquito Control Association) and MVCAC (Mosquito and Vector Control Association of California) membership directories. On January 11, 2000, 338 questionnaires were mailed to selected vector control agencies across the United States to solicit information regarding vectors associated with stormwater management structures (Appendix A, B). Of these, 85 were sent to agencies within the state of California and 253 were sent out-of-state (Appendix C, D); however, because the AMCA out-of-state list provided individual rather than agency membership information, several agencies inevitably received more than one questionnaire. As a result, 40 questionnaires were duplicates sent to out-of-state agencies. This brought the actual number of contacted agencies down to 298.

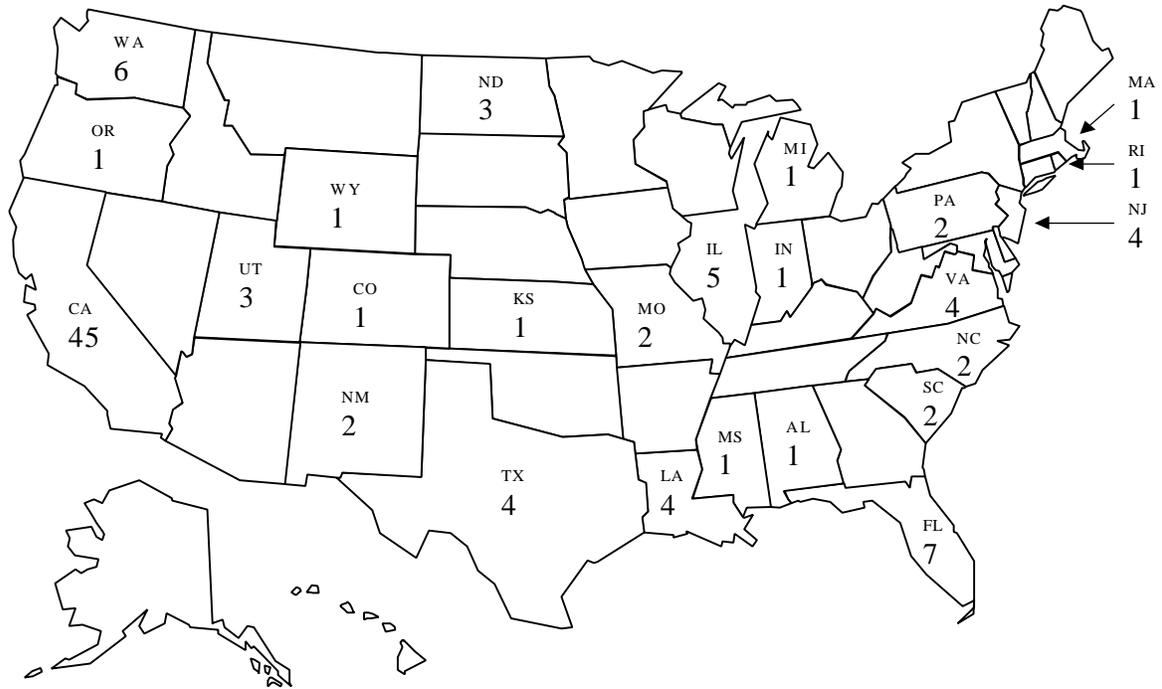
Exactly 105 agencies (35%) participated in the CDHS-VBDS BMP survey by returning the questionnaire. These included responses from 25 states and represented areas with dramatically different climates, ecosystems, and number of human inhabitants. The geographical distribution of participating agencies is graphically illustrated in Figure 1 and outlined in Figure 2. The California bias is a result of the frequent interactions between CDHS-VBDS and local agencies as well as the large number of vector control agencies present throughout the state. Copies of the completed forms of participating vector control agencies are arranged alphabetically by state in Appendix E (available upon request) and include agency information, names of contact persons, and a short description of the geographical area covered by the agency in the event that follow-up contacts or response verifications are needed.

The information contained in this report is based only on surveys that provided information on BMP or BMP-like structures. Of the 105 participating agencies, 33 were unable to provide information on stormwater management structures. The remaining 72 participating agencies completed the survey and provided information on BMP and/or stormwater devices and vector production. These included 34 of 45 (76%) responses within California and 38 of 60 (63%) out-of-state responses. Future reference to ‘participating agencies’ will include only the 72 contributing agency responses.

**Figure 1. Distribution of Participating Agencies**



**Figure 2. Geographical Distribution of Participating Agencies**



## Stormwater Retention and Treatment

**Structures.** The importance of stormwater management is well known throughout the United States and elsewhere because of the potentially devastating effects of flooding on human activities. Because of this, preventative management practices and structures have been widely incorporated, from small rural communities to large urban centers. Not surprisingly, 94% of participating vector control agencies reported that new development in their districts required the construction of stormwater control structures. Unfortunately, these structures often retain standing water for days or weeks, thus providing the aquatic habitat needed by immature stages of disease-carrying vectors and nuisance species. In compliance with local health and safety codes, vector control agencies are usually left with the task of monitoring these habitats for vector breeding and taking the necessary abatement steps before they create health or nuisance problems. Responses to the CDHS-VBDS survey indeed showed that 79% of participating agencies were required to monitor these structures on a regular basis.

Participating vector control agencies listed a wide variety of stormwater control structures with which they were familiar, indicative of the large number of usable systems and technologies that have been employed for the purpose of stormwater management in past and present times (Table 1). The reported functions of these structures in order of decreasing frequency were: flood control (61/72), stormwater pollutant removal (27/72), recharge of underground aquifers (13/72), and wildlife mitigation wetlands (2/72). By far the most recognized stormwater management structures are retention or detention basins and ponds listed by 54 of the participating agencies. Other systems were reported  $\leq 20$  times and are summarized in Table 1. Interestingly, these structures were not necessarily associated with roadways or freeways, even within districts primarily responsible for urban areas. For example, some predominantly rural districts reported up to 100% of local stormwater structures along freeways or roadways, whereas some urban districts reported as few as zero.

**Table 1.** Stormwater Control Structures and Devices Familiar to Participating Vector Control Agencies

<b>Stormwater Control Structure / Device</b>	<b>Out-of-State</b>	<b>California</b>	<b>Total</b>
Detention/ Retention Basins and Ponds	30	24	54
Infiltration/ Percolation/ Water Recharge Basins	8	12	20
Debris/ Catch Basins, Vaults, Sumps	9	10	19
Flood Control/ Stormwater Channels	1	10	11
Grass Swales / Strips	5	6	11
Storm Sewers/ Drains	6	4	10
Ditches	4	3	7
Wetlands	2	1	3
Media Filters	0	3	3
Oil-Water Separators	0	3	3
Drain Inlet Inserts	1	2	3
Weirs/ Dams	2	0	2
Multi-Chambered Treatment Trains	0	1	1
Continuous Deflector Separators	0	1	1

**Best Management Practices (BMPs).** Familiarity with BMPs was split exactly in half, with 35 participating agencies familiar and 35 unfamiliar with them (2 did not comment). In addition, BMPs were present in approximately 50% of the agencies' districts, with 30 reporting to have them, 29 not having them, and 10 uncertain if any were present within their districts. Those that did have BMPs were asked to identify and list them by referring to the Caltrans color pamphlet sent as an attachment to the questionnaire. The most common BMPs were wet basins and extended detention basins, followed by bioswales, oil-water separators, and media filters. Table 2 summarizes the frequency of BMP designs reported by the participating vector control agencies and includes one BMP design not listed by Caltrans.

**Table 2.** Best Management Practices (BMPs) for Removing Pollutants from Stormwater Runoff Familiar to Participating Vector Control Agencies

<b>Best Management Practice (BMP)</b>	<b>Out-of-State</b>	<b>California</b>	<b>Total</b>
Wet Basins	9	11	20
Extended Detention Basins	8	10	18
BioSwales / Strips	3	7	10
Oil-Water Separators	5	3	8
Media Filters	2	5	7
Infiltration Basin	1	3	4
Drain Inlet Inserts	0	2	2
BioSwale/ Infiltration Trench	0	1	1
Multi-Chambered Treatment Trains	0	1	1
Continuous Deflector Separators	0	1	1
Vortecnix Interceptor-Cyclonic	0	1	1

Many of the stormwater control structures listed by the participating vector control agencies probably fall under the current definition of a “Best Management Practice” for the particular area and application. In particular, retention and detention basins and ponds probably function similarly to the Caltrans extended detention basins. However, responses to the CDHS-VBDS survey indicate that a large number of agencies do not recognize the term “BMP” in reference to stormwater runoff and/or stormwater management structures. This is reflected in the answers to questions 10 through 12, which focus on familiarity with BMPs used for removing pollutants from stormwater runoff. A misunderstanding is particularly evident in some of the responses to question #11, which asks if BMPs are present in the agencies’ district. The following 3 examples represent the confusion associated with BMPs:

- 1) Six out-of-state agencies and 5 California agencies did not know if BMPs were present within their districts.

- 2) Two out-of-state and 5 California agencies responded “No” to being familiar with and/or having BMPs within their districts, but then proceeded to list BMP types they recognized from the Caltrans pamphlet. These districts were obviously unclear on the definition of a BMP.

- 3) In some cases, agencies answered “No” when asked if their district had BMPs, even though they had previously listed stormwater control structures (question 7) such as wetlands, infiltration basins, grass biofilters, extended detention basins, and infiltration trenches familiar to their district. Again, these districts were obviously unclear on the definition of a BMP.

## **Vector Production Associated with Stormwater Retention Structures**

One of the primary concerns of CDHS-VBDS is the degradation of stormwater management structures over time. In general, structures are subject to environmental damage and clogging, which results in standing water and associated vector production, particularly mosquitoes. The majority of stormwater structures listed by the participating vector control agencies have been in use for long periods of time. For example, 58% of the out-of-state agencies and 50% of those in California listed structures that had been in service for over 10 years. Structures in use for 5 years or more were listed by 79% of the out-of-state agencies and 74% of those in California. These serve as excellent examples of long-term implementation of stormwater structures over time. The conditions that encourage the production of vector species over time should be carefully considered in future plans.

Vector production associated with stormwater management structures was listed by approximately 86% of the participating vector control agencies. Of the 72 participants, 33/38 out-of-state (86%), and 29/34 California participants (85%) reported mosquito production. Several factors contribute to the suitability of these structures to produce vectors. At times, structures were reported to have design flaws that allowed standing water or slow drainage; however, the most important factor is irregular maintenance (or lack of maintenance altogether) that results in the excessive growth of emergent vegetation and the accumulation of silt and debris, both which ultimately clog structures. The resulting stagnant water that remains is usually high in concentrations of organic material and is attractive to egg-laying female mosquitoes. It also provides an excellent larval habitat that is usually free of predators and with plenty of food. Only three out-of-state agencies and two California agencies reported that vectors were not associated with stormwater management structures in their area. The structures listed by the three out-of-state agencies included oil-water separators, infiltration basins, ponds, and a media filter, whereas the two agencies in California listed wet basins, extended detention basins, and catch basins.

Overall, a variety of structures were listed as important producers of vectors by participating agencies. However, the importance of one design over another with

regards to vector production could not be quantified from the available information on the CDHS-VBDS questionnaire. In addition, the thoroughness of monitoring and maintenance protocols implemented by the individual agencies may differ.

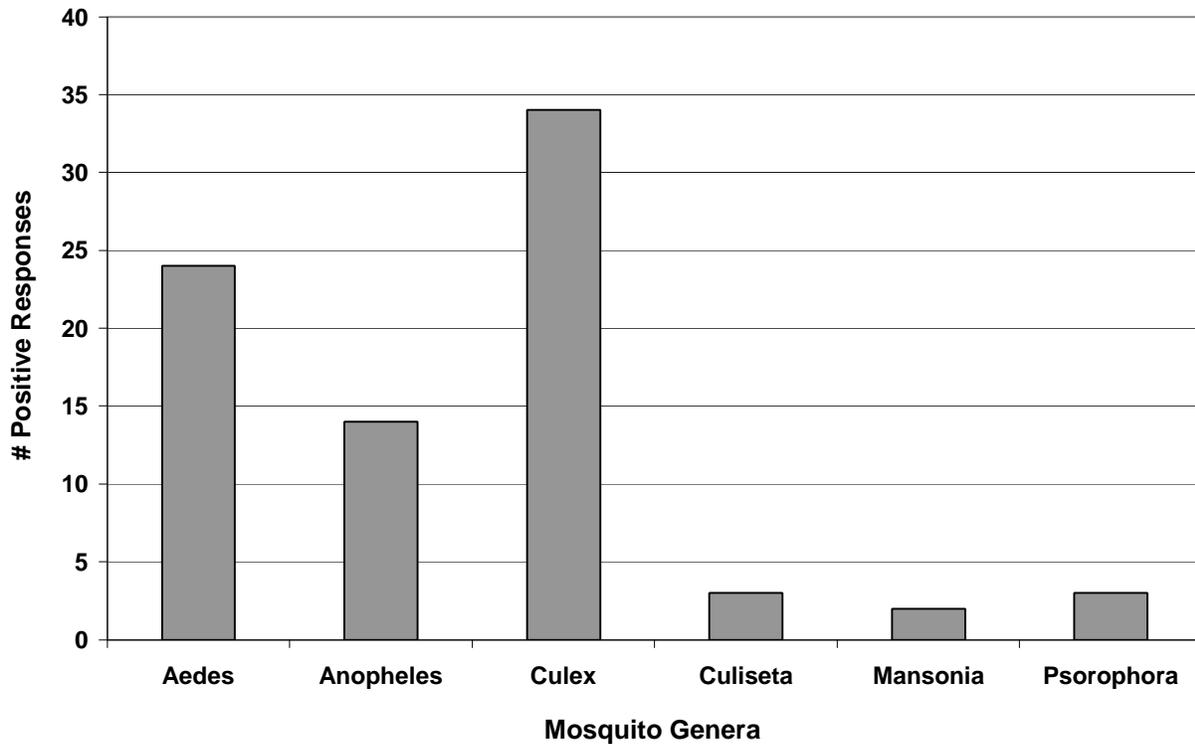
**Mosquitoes.** Over 2500 species of mosquitoes have been described from around the world. These insects occupy practically every conceivable ecological niche, which is reflected by tremendous variations in the biology and ecology of individual genera or species. One unifying feature of this group is that they all have obligate aquatic larvae. Aquatic habitats are chosen and utilized by different species based on a wide variety of factors including nutritional requirements, egg-laying behavior, and climate; however, any source of standing water will usually provide suitable habitat for at least some mosquito species. Unfortunately, opportunistic mosquito species likely to inhabit temporary pools of standing water, especially in disturbed habitats, are those that are also important vectors of human and animal diseases. It is because of this that the design of stormwater BMP structures becomes crucial and they must be engineered to prevent the retention of water for no more than 3 days (72 hours). It is also important to note that mosquito larvae can develop in extremely shallow water and since they breathe atmospheric air, may even survive short periods of time without water as long as the environment remains moist.

There are two distinct groups of mosquitoes that utilize habitats created by stormwater management structures. The permanent water species lay their eggs directly on the water surface or on the leaves of aquatic plants. Eggs of species such as *Anopheles*, *Coquillettidia*, *Culiseta*, *Culex*, *Mansonia*, and *Uranotaenia* do not require external stimuli and hatch within a few days. The floodwater species deposit eggs on moist soil around aquatic systems and the eggs hatch when submerged by rising water levels. These ‘floodwater’ mosquitoes include the genera *Aedes* and *Psorophora*. These behavioral differences have major impacts on the species that may utilize different structural BMP designs. BMPs engineered with minimal or infrequent water level fluctuations (e.g. MCTT settling basin) seldom support floodwater mosquitoes. In contrast, permanent or semi-permanent aquatic systems, particularly those containing

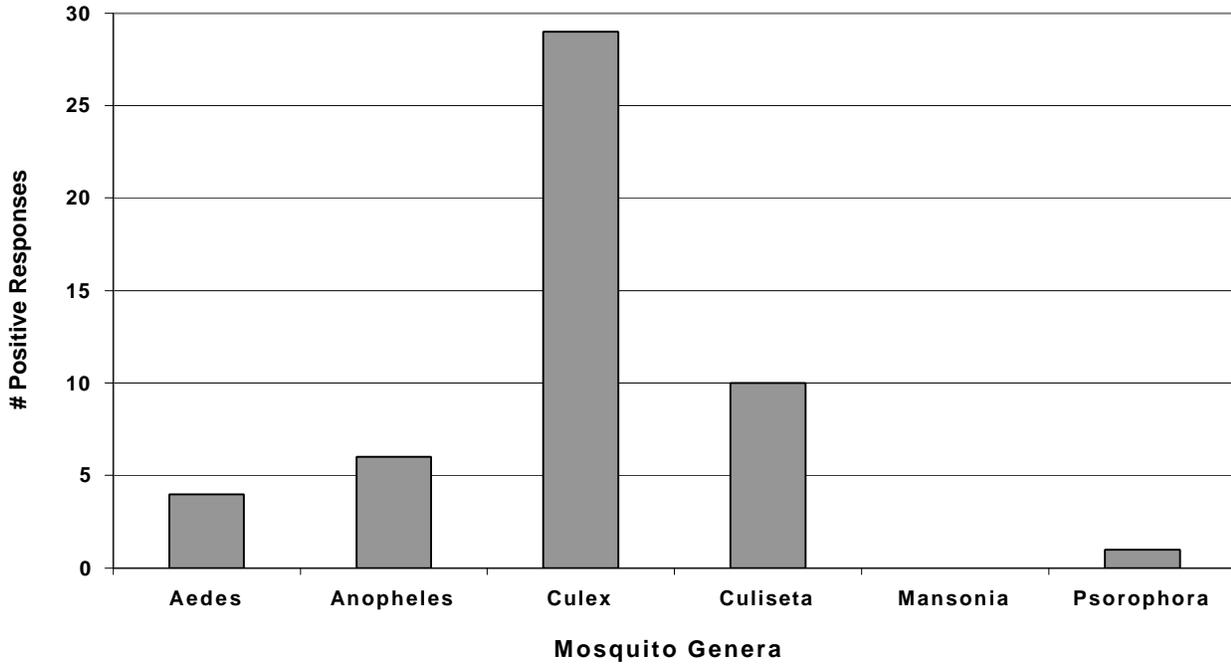
emergent vegetation and nutrient-rich water, can provide suitable habitat for both groups of mosquitoes.

Based on responses to the CDHS-VBDS survey, it is apparent that a variety of mosquito species utilize stormwater management devices throughout the United States (Figures 3, 4, 5). Mosquitoes in the genus *Culex* were reported most commonly (63/72) as utilizing stormwater devices both in the state of California and elsewhere (Figure 5). Other species reported to use these structures, in order of abundance, included mosquitoes in the genera *Aedes* (28/72), *Anopheles* (20/72), *Culiseta* (13/72), *Psorophora* (4/72), *Coquillettidia* (4/72), and *Mansonia* (2/72).

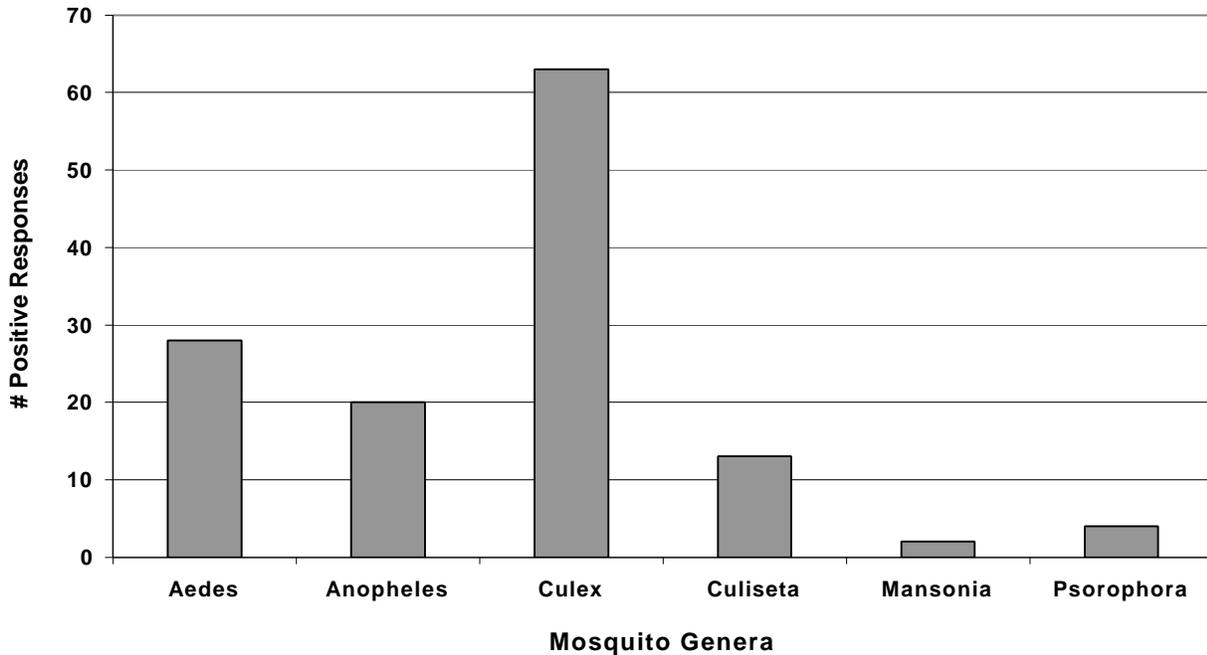
**Figure 3. Mosquito Genera Utilizing Stormwater Management Devices Outside the State of California**



**Figure 4. Mosquito Genera Utilizing Stormwater Management Devices Within the State of California**



**Figure 5. Mosquito Genera Utilizing Stormwater Management Devices in the United States**



**Other Vectors and Nuisance Species.** The construction of stormwater management structures can create attractive habitats for a variety of other vector and/or nuisance pests. Table 3 summarizes the pests associated with these structures in the United States and demonstrates the magnitude of potential pest problems. Chironomid midges were reported to be a secondary, yet significant problem in stormwater management structures. These insects are associated primarily with large retention ponds and lakes. Even though midges are not disease vectors, they can create extreme nuisance and public health situations (i.e. from inhalation) with nearby homeowners. Rodents and black flies were also frequently present in and around stormwater structures. Black fly larvae require running water and were associated with flood control channels.

**Table 3.** Species Other Than Mosquitoes Associated with Stormwater Management Structures Throughout the United States.

<b>Vector and Nuisance Species</b>	<b>Out-of-State</b>	<b>California</b>	<b>Total</b>
Midges	14	21	35
Rats	4	5	9
Black Flies	2	3	5
Mice	1	6	7
Squirrels	0	6	6
Roaches	3	2	5
Sand Flies	2	1	3
Culicoides Midges	1	1	2
Muskrats	1	0	1
Skunks	0	1	1
Snakes	1	0	1
Alligators	1	0	1

## Maintenance Concerns

The factors that contributed to the suitability of stormwater management structures to breed vector species were closely tied with routine maintenance. Questionnaire responses indicated that those responsible for routine maintenance and repairs varied widely. Some of the listed groups or individuals included city, county, or state agencies (e.g. Dept. of Public Works, Water Management District, local Dept. of Transportation), property owners or property owner associations, and developers. Possibly due to the diversity of responsible parties, the maintenance of the stormwater structures was variable. Cleaning of the structures ranged from more than twice per year to never; however, the number of structures that were reportedly never maintained was strikingly high. In total, 42% (13 out-of-state and 17 California agencies) of the participating agencies reported a complete lack of maintenance in some or all of the stormwater structures in their districts.

The accumulation of vegetation, silt, and debris in stormwater management structures is inevitable and is the primary reason that they must be maintained to prevent the occurrence of standing water. These factors were responsible for the creation of habitats conducive to the breeding of vector and nuisance species. Vegetation overgrowth was a problem reported in structures from 28 (74%) out-of-state and 27 (79%) California agencies. Similarly, silt and debris accounted for problems in structures in 26 (68%) out-of-state and 20 (59%) California agencies. In response to vegetation, many of the participating agencies took preventative measures to mitigate overgrowth and resulting vector problems. Methods employed to reduce or eliminate vegetation from problem areas included mowing, disking, herbiciding, physical removal, and legal pursuit of those responsible to perform maintenance. However, in many cases the structures were left completely unmanaged.

Another factor that contributed to the suitability of these structures to hold water was apparently due to structural damage and improper design and construction. A number of participating agencies (7 out-of-state and 3 in California) noted that structures were poorly designed and/or constructed, which often resulted in ponding due to improper drainage grades. Structural damage was indicated as causing vector

problems by 2 out-of-state agencies. Lastly, one out-of-state agency commented that some structures were designed well in theory, but “were not adaptable” to changing environmental conditions; however, no other details were included in the response.

There are additional non-weather related factors that can increase vector production in stormwater structures. The primary factor contributing to standing water in these structures was landscape irrigation runoff. This was a problem reported by 5 out-of-state and 19 California agencies and demonstrates the unexpected situations that can be associated with these stormwater structures. Other unexpected factors that contributed to standing water in structures included rising and falling tides in coastal zones, high groundwater tables, agricultural irrigation runoff, residential pool cleaning, and washing vehicles.

## **Role of Vector Control**

CDHS-VBDS is in favor of and supports water quality improvements. However, it is crucial that public health issues are addressed during the process of designing and implementing new stormwater structures for flood control and/or pollution removal. Comments made by participating vector control agencies demonstrate that most stormwater management structures are not designed to prevent or reduce vectors. This in turn creates additional public health issues that vector control agencies are responsible for.

It is apparent from responses to the CDHS-VBDS questionnaire that most participating vector control agencies are not required to take an active role in the design and/or implementation of stormwater management structures. Only 7 out-of-state agencies and 9 California agencies are reportedly required to work with these structures, while the vast majority (75%) are not. The level of involvement with the construction of new stormwater management structures reported by these agencies varied. For example, one agency only becomes involved upon request, two agencies encourage the review of design criteria, and one requires full vector control approval of engineered plans and systems. Five other agencies are willing to provide consultation, guidance, and written materials to planners and developers before structures are built for proper mosquito management and prevention. Table 4 lists the informative material used by the participating vector control agencies.

**Table 4.** Informative Material Used to Assist Planners and Developers in Proper Vector Management and Prevention in Stormwater Management Structures.

<b>Title</b>	<b>Type</b>	<b>District</b>	<b>State</b>
Operations and Maintenance Criteria	<b>Informative Pamphlet</b>	Marin/Sonoma MVC	<b>CA</b>
Retention-Detention Systems	<b>Informative Pamphlet</b>	Marin/Sonoma MVC	<b>CA</b>
Control of Mosquito Breeding in Permitted Stormwater Systems	<b>Research Report</b>	Sarasota County MMS	<b>FL</b>
Mosquito Prevention in Stormwater Systems	<b>Informative Brochure</b>	Sarasota County MMS	<b>FL</b>
The Great Dipper Debate. Wing Beats, Vol 10, No. 1, 1999	<b>Article</b>	Sarasota County MMS	<b>FL</b>
Florida Mosquito Control: The State of the Mission as Defined by Mosquito Controllers, Regulators, and Environmental Managers	<b>Book</b>	Indian River MCD	<b>FL</b>
BMPs for Mosquito Control and Freshwater Wetlands Management	<b>Manual</b>	Middlesex County MEC	<b>NJ</b>
Stormwater Management Facilities Maintenance Manual	<b>Manual</b>	Middlesex County MEC	<b>NJ</b>
Soil Erosion and Sediment Control in New Jersey	<b>Manual</b>	Middlesex County MEC	<b>NJ</b>
Mosquito Species and Population Levels Associated with Stormwater Facilities in New Jersey	<b>Report</b>	Middlesex County MEC	<b>NJ</b>
Stormwater and Nonpoint Source Pollution Control Best Management Practices Manual	<b>Manual</b>	New Jersey DEP	<b>NJ</b>
Stormwater Management Regulations. <a href="http://www.deq.state.va.us/water/">www.deq.state.va.us/water/</a>	<b>Internet Site</b>	City of Portsmouth Mosquito Control	<b>VA</b>

Despite the involvement of some vector control agencies in the planning of stormwater management structures, the vast majority of structures require routine monitoring and vector abatement to avoid potential threats to public health. Approximately 24% (13 out-of-state and 4 in California) of participating vector control agencies reported not providing source reduction efforts at structures within their districts. This may be due to structures falling outside the agencies' jurisdiction. However, the remaining 55 (76%) agencies do provide source reduction services to limit the potential of these structures to harbor or produce vector problems. These services may include general vegetation and/or silt and debris clean up. Reduction of vegetation

in and around structures involves several techniques including herbiciding, disking, and mowing. This is done in addition to routine monitoring and abatement of vectors. Of the participating agencies, six out-of-state and 4 California agencies also stock large bodies of permanent or semi-permanent water with mosquito fish to provide biological control of vector larvae. Agencies that wish to avoid maintenance of private structures will contact responsible agencies or parties to request cleaning and maintenance of their structures before they create vector problems.

Most participating vector control agencies are concerned about the construction of additional stormwater management structures due to the irregular maintenance and design criteria associated with most of the ones currently in use. The desire of vector control agencies to be included in the design process of new stormwater management structures was almost unanimous. Exactly 28 out-of-state and 29 California agencies (79%) are interested in being involved in the design process of the stormwater management structures and believe that past designs could have been improved if vector issues had been considered. Comments made by the participating vector control agencies illustrate their ideas and suggestions and demonstrate the possible contributions that could be incorporated into designs to allow both water quality improvements as well as proper management and reduction/ elimination of vectors. Examples of some of the vector agency comments for reducing and/or preventing vector problems are listed in Table 5. Some of these comments also express opinions on how current situations could be improved.

**Table 5.** Comments Made by Participating Vector Control Agencies on Possible Improvements to Current and Future Stormwater Management Structures.

Engineer structures to allow complete water drainage in < 5 days.
Provide an approved maintenance schedule and agreement in writing as well as a list of responsible agencies / persons to be contacted if needed.
Improve current maintenance programs and designs.
Structures with permanent water should be designed with steep sides and deep water to allow maintenance of fish biological controls.
Use a cement liner when possible to improve water flow and prevent vegetation growth.
Provide access for routine vector inspections and abatement.
Provide mandatory budgeting for maintenance.
Prevent "wet" systems from becoming jurisdictional wetlands by providing regular vegetation maintenance.
Use designs with low maintenance requirements.
Owners should reimburse vector control agencies for inspection and treatment if inadequate maintenance results in vector production.
Regulate off-site irrigation.
Require a legal means to enforce use and maintenance of structures.
Make it mandatory that vector control agencies be involved in the design and maintenance plans of future stormwater management structures.
Develop a state-wide contract for mosquito / vector control with agencies responsible for construction of stormwater management structures whereby the appropriate vector control agency is funded for costs of vector control based on agreed rates (e.g. based on California health and safety code section 2283.5).

## Conclusions

Results presented in this report provide a preliminary assessment of the potential vector production and abatement issues associated with stormwater management structures in the United States based on the responses of 105 participating vector control agencies. The document reflects the relevant concerns of the agencies and their employees responsible for preventing vector-borne disease and nuisance threats to the public. This survey has demonstrated and provided evidence that stormwater management structures may create suitable habitats for disease vectors unless preventative design and subsequent maintenance practices remain a priority. Information indicates that adequate maintenance of these structures is imperative to prevent production of disease vectors and nuisance pests.

This study demonstrates the desire for collaboration between those interested in water quality and vector control agencies. Vector control agencies should be consulted to provide design and construction input to insure compliance with the appropriate health and safety codes. Vector control agencies that responded to the CDHS-VBDS questionnaire were unanimous in their desire to have been included in the design process of the stormwater units. Many structures could have been improved if vector issues had been considered prior to construction. Local and state vector control personnel wish to be directly involved in development and implementation of best management practices for the construction and maintenance of economically efficient, biologically acceptable and environmentally compatible stormwater management structures.

## **APPENDIX A:**

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### **Questionnaire Cover Letter**

**DEPARTMENT OF HEALTH SERVICES**

Vector-Borne Disease Section  
2151 Convention Center Way, Suite 218  
Ontario, CA 91764-5429  
(909) 937-3440



January 11, 2000

Dear Colleague:

**MANAGEMENT OF STORMWATER RUNOFF AND DISEASE VECTOR PRODUCTION**

The California Department of Health Services (DHS) is involved in a broad, multi-agency study to determine water quality benefits of structural Best Management Practices (BMPs) retrofitted to California Department of Transportation (Caltrans) existing stormwater drainage facilities. The outcome of this study will have strong implications on methods that may be federally mandated in the near future for the management of stormwater runoff. The BMPs, as applied to stormwater runoff management, may represent promising practices to reduce stormwater pollution. The Caltrans BMP Pilot Retrofit Project will evaluate the efficiency of various structurally-engineered designs for improving quality of stormwater runoff before being discharged into natural waterways. An unintended consequence of this effort may directly impact operations of vector control agencies by increasing habitat availability for aquatic stages of disease vectors, and by providing harborage, food, and moisture for reservoir and nuisance species.

In addition to reviewing the BMP design and operations data, the role of DHS is to conduct studies that will identify which of these designs are least conducive for vector production. Since the use of BMPs was adopted in the 1970s by civil engineers, various transportation agencies around the country commissioned the use of different designs along their highways. If any of these or other BMP designs (see enclosed pamphlet) have been constructed within your agency's jurisdiction, we would appreciate the sharing of your experiences and knowledge with regard to vector production through the completion of the enclosed questionnaire. Please return the questionnaire to the above address by February 18, 2000.

If your agency has no experience with these structures, please respond to avoid follow-up correspondence. We appreciate your time in responding to this questionnaire. If you require further information, please contact J. Wakoli Wekesa, Ph. D., or Jeanne-Marie Lane at (909) 937-3440 or e-mail

Dr. Wekesa, [wwekesa@dhs.ca.gov](mailto:wwekesa@dhs.ca.gov) or Ms. Lane, [jlane@dhs.ca.gov](mailto:jlane@dhs.ca.gov). For more information about Caltrans stormwater research go to <http://www.dot.ca.gov/hq/Environmental/stormwater/index.html>.

Sincerely,

Vicki L. Kramer, Ph.D., Chief  
Vector-Borne Disease Section

Enclosures

## **APPENDIX B:**

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### **Questionnaire**

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Email Address: \_\_\_\_\_

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban \_\_\_\_\_ % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

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8. What percentage of these structures are along freeways or roadways?  
\_\_\_\_\_ %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes                  No

11. Does your agency have BMPs in your district?

Yes                  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins    Extended Detention Basins                  Bioswales
- Media Filters                  Oil Water Separators
- Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
\_\_\_\_\_ months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes                  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

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16. Which mosquito species commonly utilize these structures?

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches

Rats                      Mice                      Squirrels

Other (please describe).

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18. List any factors that contribute to the suitability of these structures to produce vectors?

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#### **IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

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20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes            No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes            No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes            No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes                      No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

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31. Other comments that you would like to make.

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## **APPENDIX C:**

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### **California Agency Mailing List**

Alameda County MAD  
23187 Connecticut Street  
Hayward, CA 94545

Contra Costa MVCD  
155 Mason Circle  
Concord, CA 94520

Napa County MAD  
Post Office Box 655  
Napa, CA 94559

San Mateo County MAD  
1351 Rollins Road  
Burlingame, CA 94010

Glenn County MVCD  
165 Co. Rd. G.  
Willows, CA 95988

Solano County MAD  
2950 Industrial Court  
Fairfield, CA 94533

Butte County MVCD  
5117 Larkin Road  
Oroville, CA 96013

Alameda County VCSD  
1131 Harbor Bay Parkway  
Alameda, CA 94502

Marin-Sonoma MVCD  
556 N. McDowell Blvd.  
Petaluma, CA 94954

No. Salinas Valley MAD  
342 Airport Blvd.  
Salinas, CA 93905

Santa Clara County VCD  
976 Lenzen Drive  
San Jose, CA 95126

Santa Cruz County MAD  
640 Capitola Road  
Santa Cruz, CA 95062

Burney Basin MAD  
Post Office Box 1049  
Burney, CA 96013

Colusa MAD  
Post Office Box 208  
Colusa, CA 95932

Durham MAD  
PO Box 386  
Durham, CA 95938

Lake County VCD  
PO BOX 310  
Lakeport, CA 95453

Pine Grove MAD  
PO BOX 328  
McArthur, CA 96056

Shasta MVCD  
Post Office Box 990331  
Redding, CA 96099

Sacramento-Yolo MVCD  
8631 Bond Road  
Elk Grove, CA 95624

Tehama County MVCD  
PO BOX 1005  
Red Bluff, CA 96080

Merced County MAD  
PO BOX 909  
Merced, CA 95341

Turlock MAD  
4412 North Washington Road  
Turlock, CA 95380

East Side MAD  
2000 Santa Fe Avenue  
Modesto, CA 95357

San Joaquin County MVCD  
7759 S. Airport Way  
Stockton, CA 95206

Coalinga-Huron MAD  
PO BOX 447  
Coalinga, CA 93210

El dorado Co. V. C.-CSA3  
1170 Rufus Allen Road  
S. Lake Tahoe, CA 96150

Consolidated MAD  
PO BOX 278  
Selma, CA 93662

Delano MAD  
PO BOX 220  
Delano, CA 93216

Fresno MVCD  
PO BOX 2  
Fresno, CA 93707

Fresno Westside MAD  
PO BOX 125  
Firebaugh, CA 93622

Tulare MAD  
PO BOX 1476  
Tulare, CA 93275

Antelope Valley MVCD  
PO BOX 1192  
Lancaster, CA 93584

West Side MVCD  
PO BOX 205  
Taft, CA 93268

City of Moorpark VC  
799 N. Moorpark Avenue  
Moorpark, CA 93021

Delta MAD  
PO BOX 310  
Visalia, CA 93279

Kern MAD  
4705 Allen Road  
Bakersfield, CA 93312

Kings MAD  
PO BOX 907  
Hanford, CA 93232

Madera County MAD  
900 North Gateway Drive  
Madera, CA 93637

Coachella Valley MVCD  
83-733 Avenue 55  
Thermal, CA 92274

Greater L. A. County VCD  
12545 Florence Avenue  
Santa Fe Springs, CA 90670

Northwest MVCD  
1966 Compton Avenue  
Corona, CA 91719

Owens Valley MAP  
207 W. South Street  
Bishop, CA 93514

Compton Creek MAD  
1224 So. Santa Fe Avenue  
Compton, CA 90221

Los Angeles County W. VCD  
6750 Centinela Avenue  
Culver City, CA 90230

Orange County VCD  
PO BOX 87  
Santa Ana, CA 92702

San Bernardino County  
2355 E. 5th Street  
San Bernardino, CA 92415

Santa Barbara Coastal VCD  
PO BOX 1389  
Sumerland, CA 93067

San Gabriel MVCD  
1145 N. Azusa Canyon Road  
West Covina, CA 91790

West Valley MVCD  
13355 Elliot Avenue  
Chino, CA 91710

COUNTY OF AMADOR  
ENVIRONMENTAL HEALTH DEPARTMENT  
500 ARGONAUT LANE  
JACKSON, CA 95642

COUNTY OF CONTRA COSTA  
ENVIRONMENTAL HEALTH  
2120 DIAMOND BOULEVARD, SUITE 200  
CONCORD, CA 94520

COUNTY OF ALPINE  
HEALTH DEPARTMENT  
P. O. BOX 545  
MARKLEEVILLE, CA 96120

COUNTY OF CALAVERAS  
ENVIRONMENTAL HEALTH  
GOVERNMENT CENTER  
891 MOUNTAIN RANCH ROAD

SAN ANDREAS, CA 95249  
COUNTY OF COLUSA  
ENVIRONMENTAL HEALTH  
P. O. BOX 610  
251 EAST WEBSTER STREET  
COLUSA, CA 95932

COUNTY OF BUTTE  
DIVISION OF ENVIRONMENTAL HEALTH  
18-B COUNTY CENTER DRIVE  
OROVILLE, CA 95965-3397

CITY OF BERKELEY  
ENVIRONMENTAL HEALTH  
2180 MILVIA STREET, 3rd FLOOR  
BERKELEY, CA 94704

COUNTY OF EL DORADO  
ENVIRONMENTAL MANAGEMENT  
DEPARTMENT  
ENVIRONMENTAL HEALTH DIVISION  
2850 FAIRLANE COURT  
PLACERVILLE, CA 95667

COUNTY OF KINGS  
DIVISION OF ENVIRONMENTAL HEALTH  
330 CAMPUS DRIVE  
HANFORD, CA 93230

COUNTY OF LAKE  
ENVIRONMENTAL HEALTH  
922 BEVINS COURT  
LAKEPORT, CA 95453

COUNTY OF LOS ANGELES  
ENVIRONMENTAL HEALTH DIVISION  
2525 CORPORATE PLACE, SUITE 150  
MONTEREY PARK, CA 91754

COUNTY OF HUMBOLDT  
DIVISION OF ENVIRONMENTAL HEALTH  
100 H STREET, SUITE 100  
EUREKA, CA 95501

COUNTY OF KERN  
ENVIRONMENTAL HEALTH SERVICES  
DEPT  
2700 M STREET, SUITE 300  
BAKERSFIELD, CA 93301-2370

COUNTY OF LASSEN  
ENVIRONMENTAL HEALTH  
555 HOSPITAL LANE  
SUSANVILLE, CA 96130

CITY OF LONG BEACH  
DEPT OF HEALTH & HUMAN SERVICES  
2525 GRAND AVENUE, ROOM 318  
LONG BEACH, CA 90815

COUNTY OF LOS ANGELES  
ENVIRONMENTAL HEALTH/HEALTH  
FACILITIES  
2525 CORPORATE PLACE  
MONTEREY PARK, CA 91754

COUNTY OF MENDOCINO  
ENVIRONMENTAL HEALTH  
MENDOCINO COUNTY COURTHOUSE  
UKIAH, CA 95482

COUNTY OF MODOC  
ENVIRONMENTAL HEALTH  
202 WEST 4th STREET  
ALTURAS, CA 96101

COUNTY OF NAPA  
ENVIRONMENTAL HEALTH  
1195 THIRD STREET, ROOM 101  
NAPA, CA 94559

COUNTY OF NEVADA  
DEPARTMENT OF ENVIRONMENTAL  
HEALTH  
P. O. BOX 6100  
950 MAIDU AVENUE  
NEVADA CITY, CA 95959-6100

COUNTY OF ORANGE  
ENVIRONMENTAL HEALTH DIVISION  
2009 EAST EDINGER AVENUE  
SANTA ANA, CA 92705-4720

CITY OF PASADENA  
PUBLIC HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH DIVISION  
100 NORTH GARFIELD, #136  
PASADENA, CA 91109

COUNTY OF MARIN  
ENVIRONMENTAL HEALTH SERVICES  
3501 CIVIC CENTER DRIVE, #236  
SAN RAFAEL, CA 94903

COUNTY OF MERCED  
DIVISION OF ENVIRONMENTAL HEALTH  
777 WEST 22nd STREET  
MERCED, CA 95340

COUNTY OF MONTEREY  
ENVIRONMENTAL HEALTH  
1270 NATIVIDAD ROAD  
SALINAS, CA 93906

COUNTY OF RIVERSIDE  
DEPARTMENT OF ENVIRONMENTAL  
HEALTH  
P. O. BOX 7600  
RIVERSIDE, CA 92513-7600

COUNTY OF SAN DIEGO  
DEPARTMENT OF ENVIRONMENTAL  
HEALTH  
VECTOR SURVEILLANCE & CONTROL  
DIVISION  
9325 HAZARD WAY  
SAN DIEGO, CA 92123-1217

COUNTY OF SANTA BARBARA  
ENVIRONMENTAL HEALTH SERVICES  
225 CAMINO del REMEDIO  
SANTA BARBARA, CA 93110-1334

COUNTY OF TEHAMA  
ENVIRONMENTAL HEALTH  
633 WASHINGTON STREET, ROOM 36  
RED BLUFF, CA 96080

COUNTY OF VENTURA  
ENVIRONMENTAL HEALTH DIVISION  
800 SOUTH VICTORIA AVENUE  
VENTURA, CA 93009-0001

CITY OF VERNON  
HEALTH AND ENVIRONMENTAL CONTROL  
4305 SANTA FE AVENUE  
VERNON, CA 90058

SOUTH FORK MAD  
P. O. BOX B  
KERNVILLE, CA 93238

COUNTY OF SUTTER  
ENVIRONMENTAL HEALTH  
P. O. BOX 1510  
1160 CIVIC CENTER, SUITE E  
YUBA CITY, CA 95993

COUNTY OF TRINITY  
ENVIRONMENTAL HEALTH  
P. O. BOX 1257  
1 INDUSTRIAL PARK WAY  
WEAVERVILLE, CA 96093

COUNTY OF TUOLUMNE  
ENVIRONMENTAL HEALTH  
2 SOUTH GREEN STREET  
SONORA, CA 95370

COUNTY OF VENTURA  
ENVIRONMENTAL HEALTH DIVISION  
800 SOUTH VICTORIA AVENUE  
VENTURA, CA 93009-0001

## **APPENDIX D:**

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### **Out-of-State Agency Mailing List**

## **ALABAMA**

MOBILE COUNTY HEALTH DEPT.  
1050 PALMETTO STREET  
MOBILE, AL 36604

CITY OF MOUNTAIN BROOK  
3579 EAST STREET  
BIRMINGHAM, AL 35243

## **ALASKA**

ALASKA DEPT. OF ENVIRONMENTAL  
CONSERVATION, 500 S. ALASKA ST.  
PALMER, AK 99645

## **ARIZONA**

PALO VERDE VECTOR & PEST CONTR  
4341 EAST BETTY ELYSE LANE  
PHOENIX, AZ 85032

## **COLORADO**

REDLANDS MOSQUITO CONTROL DIST.  
PO Box 4061  
GRAND JUNCTION, CO 81502

MESA COUNTY HEALTH DEPT.  
515 PATTERSON ROAD  
GRAND JUNCTION, CO 81506

COLORADO MOSQUITO CONTROL, INC.  
9999 OLD WADSWORTH BLVD.  
BROOMFIELD, CO 80021

ENV. PROT. SPECIALIST, WELD CNTY HLTH DEPT.  
1555 N. 17<sup>TH</sup> AVENUE  
GREELEY, CO 80631

ENV. PROT. SPECIALIST, WELD CNTY HLTH DEPT.  
1555 N. 17<sup>TH</sup> AVENUE  
GREELEY, CO 80631

BOULDER COUNTY MOSQUITO  
3450 BROADWAY  
BOULDER, CO 80304

PUEBLO CITY-CO HEALTH DEPT.  
1290 S. CAMINO PABLO LANE  
PUEBLO WEST, CO 81007

TOWN OF LIMON  
PO BOX 9  
LIMON, CO 80828

WELD COUNTY HEALTH DEPT.  
1555 N. 17<sup>TH</sup> AVENUE  
GREELEY, CO. 80631

MOFFATT COUNTY PEST MGMT.  
539 BARCLAY ST.  
CRAIG, CO. 81625-2733

ANIMAS MOSQUITO CNTRL DIST.  
PO BOX 161  
DURANGO, CO 81302

ALAMOSA MOSQUITO CNTRL DIST.  
PO BOX 818  
ALAMOSA, CO. 81101

## **CONNECTICUT**

FRANKLIN WMA  
EAST BATON ROUGE MARC  
391 RT. 32  
N. FRANKLIN, CT 06254

## **DELAWARE**

DELAWARE MOSQUITO CONTROL  
PO BOX 224  
MILFORD, DE 19963

## **FLORIDA**

LEON COUNTY MOSQUITO CONTROL  
501-A APPELYARD DRIVE  
TALLAHASSEE, FL 32304

BEACH MOSQUITO CONTROL DIST.  
1016 COX GRADE ROAD  
PANAMA CITY, FL 32407

INDIAN RIVER MCD  
5655 41<sup>ST</sup> STREET  
PO Box 670  
VERO BEACH, FL 32961

ORANGE Co. MOSQUITO CONTROL  
2715 AMERICANA BLVD.  
ORLANDO, FL 32839

LEE COUNTY MCD  
PO Box 60005  
FORT MYERS, FL 33906

AMELIA ISLAND MCD  
PO Box 62  
FERNANDINA BEACH, FL 32034

PASCO COUNTY MCD  
2308 MARATHON ROAD  
ODESSA, FL 33556

ANASTASIA MCD  
PO Box 1409  
ST. AUGUSTINE, FL 32085

OSCEOLA COUNTY MOSQUITO CONTROL  
2370 KISSIMMEE PARK ROAD  
ST. CLOUD, FL 34769

WASHINGTON Co PUBLIC HLTH UNIT  
PO Box 648  
CHIPLEY, FL 32428-0648

GAINESVILLE MOSQ. CONTROL  
405 NW 39<sup>TH</sup> AVENUE  
GAINESVILLE, FL 32609

ATTN: PUBLIC WORKS  
5 ESPLANADE AVENUE  
GREEN COVE SPRINGS, FL 32043

CITRUS COUNTY MCD  
PO Box 68  
HOMOSASSA SPRINGS, FL 34447

ATTN: PUBLIC WORKS  
5 ESPLANADE AVENUE  
GREEN COVE SPRINGS, FL 32043

MANATEE Co MOSQUITO CONT. DIST.  
PO Box 386  
PALMETTO, FL 34220

EXCAMBIA COUNTY MOSQ. CONT.  
603 WEST ROMANA STREET  
PENSACOLA, FL 32501-5548

SANTA ROSA Co MOSQ. CONTROL  
6075 OLD BAGDAD HIGHWAY  
MILTON, FL 32583

MONROE COUNTY MOSQUITO CONTROL DIST.  
5224 COLLEGE ROAD, STOCK ISLAND  
KEY WEST, FL 33040

5819 NW 57<sup>TH</sup> WAY  
GAINESVILLE, FL 32653  
GERDE, JERRY

BEACH MOSQUITO CONTROL DIST.  
1016 COX GRADE ROAD  
PANAMA CITY BEACH, FL 32407

COLLIER MCD  
600 NORTH RD  
NAPLES, FL 34104

FLORIDA MEDICAL ENTOMOLOGY LABS  
200 9<sup>TH</sup> STREET, SE  
VERO BEACH, FL 32962

PO Box 412  
MCINTOSH, FL 32664

REEDY CREEK IMPROVEMENT DISTRICT  
PO Box 10, 170  
LAKE BUENA VISTA, FL 32830-0170

FLORIDA KEYS MCD  
506 106<sup>TH</sup> ST., GULF  
MARATHON, FL 33050

BROWARD Co. MOSQ CTRL  
1200 So. UNIVERSITY DRIVE  
PEMBROKE PINES, FL 33025

DADE COUNTY MCD  
8901 NW 58<sup>TH</sup> STREET  
MIAMI, FL 33178

PUBLIC WRKS, VILLAGE TEQUESTA  
PO BOX 3273  
TEQUESTA, FL 33469

FORT MYERS BEACH MCD  
PO BOX 2837  
FT MYERS BEACH, FL 33932-2837

SARASOTA MOSQ CONTROL DIST.  
5531 PINKNEY AVENUE  
SARASOTA, FL 34233

JACKSONVILLE MOSQUITO CONTROL  
1321 EASTPORT ROAD  
JACKSONVILLE, FL 32218

PINELLAS COUNTY MOSQ CONTROL  
4100 118<sup>TH</sup> AVENUE NORTH  
CLEARWATER, FL 33762

BREVARD MOSQ CONTROL DIST  
2870 GREENBROOKE  
VALKARIA, FL 32950

LEVY COUNTY MOSQUITO CONTROL  
PO Box 248  
BRONSON, FL 32621

SOUTH WALTON COUNTY MAD  
PO Box 1130  
SANTA ROAS BEACH, FL 32459

SHEKK MOSQ CONTROL SVCS  
818 SILK OAK TERRACE  
LAKE MARY, FL 32746

## **GEORGIA**

CHATHAM COUNTY MCC  
1321 EISENHOWER DRIVE  
SAVANNAH, GA 31406

1969 FIELDS POND DRIVE NE  
MARIETTA, GA 30068-1568

RICHMOND COUNTY HEALTH DEPT.  
1916 N. LEG ROAD  
AGUSTA, GA 30909

## **ILLINOIS**

CHICAGO DEPARTMENT OF PUBLIC HEALTH  
2160 W. OGDEN  
CHICAGO, IL 60612

NORTHWEST MAD  
147 WEST HINTZ ROAD  
WHEELING, IL 60090

CLARKE ENV. MOSQ. MGMT.  
PO Box 72197  
ROSELLE, IL 60172

NORTH SHORE MAD  
4718 RUSSETT  
SKOKIE, IL 60076

SOUTH COOK COUNTY MAD  
PO Box 1030  
HARVEY, IL 60426

DESPLAINES VALLEY MAD  
PO Box 31, 8130 OGDEN  
LYONS, IL 60534-0031

REED TOWNSHIP MAD  
PO Box 227  
104 W. MAIN STREET  
BRAIDWOOD, IL 60408

MACON MAD  
3755 CUNDIFF ROAD  
DECATUR, IL 62526

DIV ENV HLTH, IL DEPT PUBLIC HLTH  
525 WEST JEFFERSON STREET  
SPRINGFIELD, IL 62761

PUBLIC WORKS DEPARTMENT  
PO Box 3020  
NAPERVILLE, IL 60566-7020

ROMEOVILLE MAD  
604 KINGSTON  
ROMEOVILLE, IL 60446-1111

## **INDIANA**

MARION COUNTY HEALTH DEPT.  
4001 EAST 21<sup>ST</sup> STREET  
INDIANAPOLIS, IN 46218

ST. JOSEPH CO. HLTH. DEPT.  
COUNTY-CITY BLDG., 8<sup>TH</sup> FLOOR  
SOUTH BEND, IN 46601

REHS SUPERVISOR RODENT/VECTOR CNTRL.  
1 NW MARTIN LUTHER KING BLVD./RM #127  
EVANSVILLE, IN 47708

## **KANSAS**

CITY OF AUGUSTA  
PO Box 489  
113 E. 6<sup>TH</sup> STREET  
AUGUSTA, KS 67010

## **LOUISIANA**

ST. TAMMANY PARISH MAD  
PO Box 696  
SLIDELL, LA 70461

NEW ORLEANS MOSQUITO CONTROL  
6601 SOUTH SHORE HARBOR DRIVE  
NEW ORLEANS, LA 70126

VERMILLION PARISH MOSQ CONTROL  
PO Box 209  
ABBEVILLE, LA 70510

JEFFERSON DAVIS PARISH MAD #1  
PO Box 917  
JENNINGS, LA 70546

CYPREPOINT POINT MOSQ CNTRL  
3306 LA 319  
FRANKLIN, LA 70538

NEW ORLEANS MOSQ/6601  
STARS & STRIPE BLVD.TERMITE CNTRL  
NEW ORLEANS, LA 70126-8012

CADDO PARISH MOSQ. & ROD. CONT.  
1500 MONTY STREET  
SHREVEPORT, LA 71101

CALCASIEU PARISH MOSQUITO CONT  
1037 TOM WATSON ROAD  
LAKE CHARLES, LA 70615

EAST BATON ROUGE MARC  
2829 LT. GEN BEN DAVIS JR., AVENUE  
BATON ROUGE, LA 70807

## **MAINE**

MUNICIPAL PEST MANAGEMENT SERV  
PO BOX 316  
YORK, ME 03909

## **MARYLAND**

MD DEPT. OF AGRICULTURE  
6701 LAFAYETTE AVENUE  
RIVERDALE, MD 20737

## **MASSACHUSETTS**

PLYMOUTH CNTY MOSQ. CONTROL  
24 PURCHASE STREET  
CARVER, MA 02330

FORESTRY & PARKS  
100 CAMBRIDGE STREET, 19<sup>TH</sup> FLOOR  
BOSTON, MA 02202

CENTRAL MASS. MCP-SUPT.  
111 OTIS STREET  
NORTHBORO, MA 01532

EAST MIDDLESEX MOSQ CONT PROJ.  
11 SUN STREET  
WALTHAM, MA 02453

BERKSHIRE COUNTY MOSQ CNTRL  
19 HARRIS STREET PROG  
PITTSFIELD, MA 01201

PLYMOUTH COUNTY MCP  
PO BOX 72, 142R PEMBROKE ST.  
KINGSTON, MA 02364

DIR. OF PUBLIC HEALTH  
45 WEST MAIN ST., RM. 25  
WESTBOUROUGH, MA 01581-1916

PLYMOUTH CNTY MOSQ. CONTROL  
12 STUART ROAD  
ROCHESTER, MA 02770

NANTUCKET D.P.W.  
188 MAKAKET RD.  
NANTUCKET, MA 02554

PLYMOUTH COUNTY MOSQ. PROJ.  
28 ROBINWOOD AVENUE  
NEEDHAM, MA 02192-2112

## **MICHIGAN**

SAGINAW COUNTY MCD  
211 CONGRESS STREET  
SAGINAW, MI 48602

TUSCOLA COUNTY MOSQUITO ABATE.  
1500 PRESS ROAD  
CARO, MI 48723

SAGINAW COUNTY MAD  
211 CONGRESS STREET  
SAGINAW, MI 48602

SAGINAW COUNTY MAC  
211 CONGRESS STREET  
SAGINAW, MI 48602

SAGINAW COUNTY MAD  
211 CONGRESS STREET  
SAGINAW, MI 48602

SAGINAW COUNTY MAD  
211 CONGRESS STREET  
SAGINAW, MI 48602

SAGINAW COUNTY MAC  
211 CONGRESS STREET  
SAGINAW, MI 48602

GREAT LAKES MOSQUITO MGMT.  
8644 STROM  
STERLING HEIGHTS, MI 48314

SAGINAW COUNTY MAD  
211 CONGRESS  
SAGINAW, MI 4860

BAY COUNTY MOSQUITO CNTRL  
810 LIVINGSTON AVENUE  
BAY CITY, MI 48708

TUSCOLA COUNTY MOSQUITO  
1500 PRESS DRIVE  
CARO, MI 48723-9291

SAGINAW COUNTY MAD  
211 CONGRESS STREET  
SAGINAW, MI 48602

## **MINNESOTA**

METROPOLITAN MCD  
2099 UNIVERSITY AVENUE W.  
ST. PAUL, MN 55104

METROPOLITAN MCD  
2099 UNIVERSITY AVE., W.  
ST. PAUL, MN 55104

HENNEPIN CO. COMM HLTH PROTECT  
1011 FIRST ST., S., SUITE 215  
HOPKINS, MN 55343

METROPOLITAN MCD  
2099 UNIVERSITY AVE W.  
ST. PAUL MN 55104

C/O McLAUGHLIN GOPRMLY KING CO.  
8810 10<sup>TH</sup> AVENUE NORTH  
MINNEAPOLIS, MN 55427

## **MISSISSIPPI**

MISSISSIPPI MVCA  
PO Box 5207  
MISSISSIPPI STATE, MS 39762

CLEVELAND MOSQUITO CONTROL  
924 AIRPORT SERVICE RD.  
CLEVELAND, MS 38732

## **MISSOURI**

ST. CHARLES COUNTY-ENVIRON  
PO BOX 111  
WENTZVILLE, MO. 63385

MOSQUITO ABATEMENT PROGRAM  
101 OAK STREET  
POPLAR BLUFF, MO 63901-5240

## **NEVADA**

CLARK COUNTY VECTOR CONTROL  
5809 EAST FLAMINGO ROAD  
LAS VEGAS, NV 89122

## **NEW JERSEY**

CAPE MAY COUNTY MEC  
PO Box 66  
CAPE MAY CT HOUSE, NJ 08210

OCEAN COUNTY MEC, DIRECTOR  
PO Box 327  
BARNEGAT, NJ 08005

OCEAN COUNTY MEC  
PO Box 327  
BARNEGAR, NJ 08005

WARREN CNTY MOSQ COMM  
PO Box 388  
OXFORD, NJ 07863

SUSSEX COUNTY MOSQUITO EXTERM COMM  
127 MORRIS TURNPIKE  
NEWTON, NJ 07860

CAMDEN CNTY MOSQ COM  
2311 EGG HARBOR ROAD  
LINDENWOLD, NJ 08021

SALEM COUNTY MOSQUITO COMM  
900 ROUTE 45 BUILDING 4  
WOODSTOWN, NJ 08098

CAPE MAY COUNTY MEC  
PO Box 66  
CAPE MAY CT HOUSE, NJ 08210

AGREVO ENVIRONMENTAL  
601 FAITOUTE AVENUE  
ROSELLE PARK, NJ 07204

CAPE MAY COUNTY MEC  
PO Box 66  
CAPE MAY CT. HOUSE, NJ 08210

CAPE MAY COUNTY MEC  
PO Box 66  
CAPE MAY CT HOUSE, NJ 08210

MIDDLESEX COUNTY MEC  
2607 PARK AVENUE  
SOUTH PLAINFIELD, NJ 07080-5

OCEAN COUNTY MEC  
PO BOX 327  
BARNEGAT, NJ 08005

CAPE MAY COUNTY MC  
PO BOX 66  
CAPE MAY CT. HOUSE, NJ 08210

CAPE MAY COUNTY MEC  
PO BOX 66  
CAPE MAY CT. HOUSE, NJ 08210

CAPE MAY COUNTY MEC  
PO BOX 66  
CAPE MAY CR. HOUSE, NJ 08210

OCEAN COUNTY MEC  
PO BOX 327  
BARNEGAT, NJ 08005

CAMDEN COUNTY MOSQ. COMM.  
2311 EGG HARBOR ROAD  
LINDENWOLD, NJ 08021

MONMOUTH COUNTY MEC  
PO BOX 162  
EATONTOWN, NJ 07724

CAPE MAY COUNTY MEC  
PO BOX 66  
CAPE MAY CT. HOUSE, NJ 08210

MIDDLESEX COUNTY MEC  
200 PARSONAGE ROAD  
EDISON, NJ 08837

MONMOUTH COUNTY MEC  
PO BOX 162  
EATONTOWN, NJ 07724

ATLANTIC COUNTY MOSQ CONTROL  
PO BOX 719  
NORTHFIELD, NJ 08225

CAMDEN COUNTY MOSQ COMM  
2311 EGG HARBOR ROAD  
LINDENWOLD, NJ 08021

WARREN COUNTY MOSQUITO COMM  
PO BOX 388, FURNACE STREET  
OXFORD, NJ 07863

HUDSON COUNTY MOSQ CNTRL  
549 DUNCAN AVENUE  
JERSEY CITY, NJ 07306

CAPE MAY COUNTY MEC  
PO BOX 66  
CAPE MAY COURT HOUSE, NJ 08210

GLOUCESTER CO. PARK & REC MCD  
6 BLACKWOOD BARNESBORO RD.  
SEWELL, NJ 08080

NORTHEAST VECTOR MANAGEMENT  
919 HWY 33, UNIT 23  
FREEHOLD, NJ 07728

## **NEW MEXICO**

EDDY COUNTY RD., DEPT.  
PO BOX 1139  
CARLSBAD, NM 88221

NEW MEXICO ENVIRONMENT DEPT.  
525 CAMINO DE LOS MARQUEZ, #4  
SANTA FE, NM 87501

DONA ANA COUNTY VECTOR CONTROL  
2025 E. GRIGGS AVENUE  
LAS CRUCES, NM 88001

## **NEW YORK**

NASSAU COUNTY MOSQ. CONT. UNIT  
20 BOBOLINK LANE  
LEVITTOWN, NY 11756

OCHD MOSQUITO CONTROL  
6230 MOLLOY ROAD  
EAST SYRACUSE, NY 13057

NY DEPT OF HLTH, BUFFALO REG  
584 DELAWARE AVENUE  
BUFFALO, NY 14202

## **NORTH CAROLINA**

NORTH CAROLINA MVCA/PUBLIC HLTH  
1631 MAIL SERVICE CENTER  
RALEIGH, NC 27699-1631

FORSYTH COUNTY HEALTH DEPT  
PO Box 686  
WINSTON-SALEM NC 27102

MECKLENBURG COUNTY HEALTH DEPT.  
700 N. TYRON STREET STE., 208  
CHARLOTTE, NC 28202

STREET DEPARTMENT  
PO BOX 128  
JACKSONVILLE, NC 28540

CITY OF ROCKY MOUNT  
PO DRAWER 1180  
ROCKY MOUNT, NC 27802-1180

CITY OF ROCKY MOUNT  
PO DRAWER 1180  
ROCKY MOUNT, NC 27802

NEW HANOVER COUNTY HLTH DEPT.  
2029 SOUTH 17<sup>TH</sup> STREET  
WILMINGTON, NC 28406

### **NORTH DAKOTA**

GRAND FORKS PUBLIC HEALTH  
122 SOUTH 5<sup>TH</sup> STREET  
GRAND FORKS, ND 58201

WILLISTON VECTOR CONTROL DIST. #1  
PO Box 17  
WILLISTON, ND 58801

STARK CO. VECTOR CNTRL DIST.  
1340 WEST VILLARD  
DICKINSON, ND 58601

CASS COUNTY VECTOR DEPARTMENT  
PO Box 698  
WEST FARGO, ND 58078

### **OHIO**

TOLEDO AREA SANITARY DISTRICT  
5015 STICKNEY AVENUE  
TOLEDO, OH 43612

LAKE COUNTY HEALTH DEPARTMENT  
33 MILL STREET  
GAINESVILLE, OH 44077

VECTOR-BORNE DISEASE UNIT, ODH  
900 FREEWAY DR., N. BLDG. 8  
COLUMBUS, OH 43229

VECTOR-BORNE DISEASE UNIT  
900 FREEWAY DR., NO. BLDG8  
COLUMBUS, OH 43229

COLUMBUS HEALTH DEPARTMENT  
181 WASHINGTON BOULEVARD  
COLUMBUS, OH 43215

TRI-STATE MOSQUITO CONTROL  
422 N. DEFIANCE ST. PO BX 458  
STRYKER, OH 43557

### **OKLAHOMA**

CITY OF SHAWNEE  
BOX 1448  
SHAWNEE, OK 74802

TULSA CITY HEALTH DEPARTMENT  
4616 E. 15<sup>TH</sup> STREET  
TULSA, OK 74112

### **OREGON**

FOUR RIVERS VCD  
3126 NE ANGELA  
BEND, OR 97701

COLUMBIA DRAINAGE VCD  
PO Box 717  
ST. HELENS, OR 97051

NORTH MORROW VCD  
PO Box 192, 3 MARINE DRIVE  
BOARDMAN, OR 97818

WEST UMATILLA VECT CONT DIST  
3005 S. FIRST STREET  
HERMISTON, OR 97838

BENTON COUNTY MCD  
98 POLK AVENUE  
UMATILLA, OR 97882

BLY VECTOR CONTROL  
PO BOX 198  
BLY, OR 97622

CLACKAMAS CO. VECTOR CONT. DIST.  
1102 ABERNETHY ROAD  
OREGON CITY, OR 97045

JACKSON COUNTY VCD  
555 MOSQUITO LN  
CENTRAL POINT, OR 97502

KLAMATH VCD  
6036 SUMMER LANE  
KLAMATH FALLS, OR 9760

**PENNSYLVANIA**

PHILADELPHIA DEPT. OF PUBLIC HLTH  
1953 W. INDIANA AVENUE  
PHILADELPHIA, PA 19132

ALLEGHENY COUNTY HEALTH DEPT.  
3190 SASSAFRAS WAY  
PITTSBURG, PA 15201

**RHODE ISLAND**

DEPT. OF ENVIRONMENTAL MGMT., MAC  
4802 TOWNE HILL ROAD  
WAKEFIELD, RI 02879

MOSQUITO ABATEMENT COORDINATION  
4808 TOWER HILL ROAD1  
WAKEFIELD, RI 02879

WESTERLY TOWN HALL  
45 BROAD STREET  
WESTERLY, RI 02891

**SOUTH CAROLINA**

CHARLESTON Co MOSQ ABATE PROG  
4370 AZALEA AVENUE  
NORTH CHARLESTON HEIGHTS, SC 29405

COMMUNITY SERVICES ASSOCIATE  
RT. 5, Box 515  
RIDGELAND, SC 29936

BEAUFORT COUNTY MOSQUITO CONTROL  
84 SHANKLIN ROAD  
BEAUFORT, SC 29906

GEORGETOWN Co. MOSQ. CONTROL  
PO DRAWER 1270  
GEORGETOWN, SC 29442

SCDHEC, ENVIRON HLTH OFFICE  
1705 W. EVANS STREET  
FLORENCE, SC 29501

KIAWAH ISLAND COMMUNITY ASSN.  
20 KESTREL CT.  
JOHN ISLAND, SC 29455

CHARLESTON Co. MOSQ ABATE PROG  
4370 AZALEA AVENUE  
NO. CHARLESTON HGHTS, SC 29405

**TEXAS**

CITY OF IRVING-DPH  
825 W. IRVING BLVD.  
IRVING, TX 75060

DIRECTOR, CHAMBERS COUNTY MC  
PO Box 1109  
ANAHUAC, TX 77514

HARRIS CNTY HLTH DEPT., MOSQ. CTRL. DIV.  
1646 OLD SPANISH TR, SUITE 108  
HOUSTON, TX 77054

JEFFERSON Co. MOSQ CNTRL DIST.  
8905 FIRST STREET  
BEAUMONT, TX 77705

CITY OF ALLEN  
ONE BUTLER CIRCLE  
ALLEN, TX 75001

CITY OF FARMERS BRANCH  
PO Box 819010  
FARMERS BRANCH, TX 75381

CORPUS CHRISTI-NUECES COUNTY DEPT.  
3041 MORGAN  
CORPUS CHRISTI, TX 78405

CITY OF BAYTOWN HEALTH DEPT.  
220 WEST DEFEE  
BAYTOWN, TX 77520

CORPUS CHRISTI-NUECES Co. DEPT.  
3041 MORGAN  
CORPUS CHRIST, TX 78405

DALLAS COUNTY HEALTH & HUMAN SVCS.  
2377 N. STEMMONS FRWY., #609  
DALLAS, TX 75207

WF-WC PUBLIC HEALTH DIST.  
1700 THIRD STREET  
WICHITA FALLS, TX 76301

CITY OF IRVING DEPT. OF HEALTH  
825 W. IRVING BLVD.  
IRVING, TX 75060

ORANGE COUNTY MCD  
123 SOUTH 6<sup>TH</sup> STREET  
ORANGE, TX 77630

BRAZORIA CNTY MOSQUITO CONT  
PO Box 1117  
ANGLETON, TX 77515

ARANSAS CNTY MOSQ CNTRL  
1931 F. M. 2165  
ROCKPORT, TX 78382

## UTAH

S. SALT LAKE CNTY MAD  
220 E. LINDON WAY  
MURRAY, UT 841070

MOAB MAD C/O GRAND COUNTY  
COURT HOUSE 125 E. CENTER  
MOAB, UT 84532

TOOLE VALLEY MAD  
704 E. BATES CANYON ROAD  
ERDA, UT 84074

PO BOX 367  
MIDVALE, UT 84047

DUCHESNE CO MOSQ ABATE DIST  
PO Box 1951  
ROOSEVELT, UT 84066

SANDY CITY PUBLIC UTILITIES  
10000 CENTINNIAL PARKWAY  
SANDY. UT 84070

TOOELE VALLEY MAD  
92 LAKEVIEW DRIVE  
STANSABURY PARK, UT 84074

SALT LAKE CITY MAD  
3278 PINON PLACE  
SALT LAKE CITY, UT 84121

EMERY COUNTY MOSQUITO CONTROL DEPT.  
PO BOX 629  
CASTLE DALE, UT 84513

BOX ELDER COUNTY  
1027 EAST 300 NORTH  
BRIGHAM CITY, UT 84302

PO BOX 983  
VERNAL, UT 84708

WEST MILLARD MOSQUITO ABATEMENT  
PO BOX 235  
HINCKLEY, UT 84635

DAVIS COUNTY MOSQUITO ABATEMENT DIST.  
85 NORTH 600 WEST  
KAYSVILLE, UT 84037

SALT LAKE CITY MAD  
624 CAMARILLA CIRCLE  
SALT LAKE CITY, UT 84104

TVMAD  
BOX 255  
STOCKTON, UT 84071

SALT LAKE CITY MAD  
2020 NORTH REDWOOD ROAD  
SALT LAKE CITY, UT 84116-1248

## VIRGINIA

DEEP CREEL MOSQUITO CONTROL  
208 LURAY STREET  
CHESAPEAKE, VA 23323

DEEP CREEK MOSQUITO CONTROL COMM  
208 LURAY STREET  
CHESAPEAKE, VA 23323-3026

WESTERN BRANCH MOSQ CONTROL  
4421 TAYLOR ROAD  
CHESAPEAKE, VA 23321

PUBLIC WORKS/OPERATIONS MGMT.  
3556 DAM NECK RD.  
VIRGINIA BEACH, VA 23456

WESTERN BRANCH MCC  
4421 TAYLOR ROAD  
CHESAPEAKE, VA 23321

WESTERN BRANCH MCC  
4421 TAYLOR ROAD  
CHESAPEAKE, VA 23321

DEEP CREEK MOSQ CNTRL COMM  
208 LURAY STREET  
CHESAPEAKE, VA 23323-3026

DEEP CREEK MOSQ CNTRL COMM  
208 LURAY STREET  
CHESAPEAKE, VA 23323-3026

COUNTY OF YORK  
PO Box 532  
YORKTOWN, VA 23690

DEEP CREEK MOSQ CONTROL COMM  
208 LURAY STREET  
CHESAPEAKE, VA 23323-3026

CITY OF PORTSMOUTH MOSQ. CONT.  
2001 FREDERICK BLVD.  
PORTSMOUTH, VA 23704-6112

WASHINGTON BOROUGH MCC  
900 HOLLOWELL LANE  
CHESAPEAKE, VA 23320

SOUTH NORFOLK MCC  
4025 ROBERTSON BOULEVARD  
CHESAPEAKE, VA 23324

### **WASHINGTON**

BENTON COUNTY MCD  
RT. 4, Box 9800  
WEST RICHLAND, WA 99353

BENTON COUNTY MCD  
301 DIVISION STREET  
GRANDVIEW, WA 98930

YAKIMA CNTY MOSQUITO CTRL  
120 ROZA VISTA DRIVE  
YAKIMA, WA 98901

BENTON COUNTY MCD  
19085 EAST 45<sup>TH</sup> AVENUE  
KENNEWICK, WA 99337

COLUMBIA MOSQUITO CONTROL DIST  
297 WEST HUMORIST  
PASCO, WA 99301

CLARK COUNTY MCD  
PO Box 1870  
2000 FT. VANC. WAY  
VANCOUVER, WA 98663

ADAMS MOSQUITO CONTROL  
410 WEST 10<sup>TH</sup>  
RITZVILLE, WA 99169

ADAMS COUNTY MOSQ CONT DIST  
PO Box 262  
OTHELLO, WA 99344

BENTON COUNTY MCD  
PO BOX 645  
PROSSER, WA 99350

BENTON COUNTY MCD  
6302 WEST 1<sup>ST</sup> AVENUE  
KENNEWICK, WA 99336

GRANT CO. MOSQ. CONT. DIST. 1  
3918 MUNICIPAL AIRPORT ROAD  
MOSES LAKE, WA 98837

CURLEW MOSQUITO CONTROL DIST.  
PO BOX 154  
CURLEW, WA 99118

### **WISCONSIN**

VECTOR CONTROL PROGRAM  
300 NORTH 4<sup>TH</sup> STREET  
LA CROSSE, WI 54601

### **WYOMING**

UINTA Co MOSQUITO CONTROL  
225 9<sup>TH</sup> STREET  
EVANSTON, WY 82930

HEALTH DEPT. ATTN: M SPURRIER  
1200 & 3<sup>RD</sup> STREET ENV HLTH DIV  
CASPER, WY 82601

CITY OF GREEN RIVER PARKS DPT.  
50 EAST 2<sup>ND</sup> NORTH  
GREEN RIVER, WY 82935

HEALTH DEPT  
1200 & 3<sup>RD</sup> STREET ENV HLTH DIV  
CASPER, WY 82601

CITY OF POWELL  
Box 1008  
POWELL, WY 82345

CITY OF WORLAND  
PO BOX 816  
WORLAND, WY 82401-0816

## **APPENDIX E:**

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### **Returned Surveys of Participating Vector Control Agencies\***

\*The following appendix contains pages that are not numbered consecutively. It should also be noted that not every participating vector control agency completed all six pages of the survey, thus some pages from individual responses will appear to be missing.

received Feb 1, 2001

### Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

#### I. Agency Information:

1. Name of Agency: City & County of Denver - Dept. of Environmental Health  
Division of Animal Control  
 Contact Person: Diane Milhollin  
 Address: 666 S. IANSON ST  
 City: DENVER State: COLORADO Zip: 80203  
 Email Address: milhobd@ci.denver.co.us

2. What is the geographical area (square miles) covered by your agency?

1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 70 % Suburban 10 % Rural 0 %?

#### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes     No

Post-it Fax Note	7671	Date	2/1/01	# of pages	6
To	MARCO METEYER	From	Diane Milhollin		
Co./Dept.		Co.	City & County of Denver		
Phone #		Phone #	303-698-5553		
Fax #	907-937-3456	Fax #	303-698-4959		

7. Which types of stormwater control structures is your agency familiar with?

Extended Detention Basins  
Infiltration Basins

8. What percentage of these structures are along freeways or roadways?

166 %

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins  Extended Detention Basins Bioswales

Media Filters Oil Water Separators

Other (describe) Infiltration Basins

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

5 months  years

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes No

- 15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

Extended Retention Basins

---



---



---

- 16. Which mosquito species commonly utilize these structures?

Culex  Anopheles \_\_\_\_\_ Aedes  Others \_\_\_\_\_

- 17. Are there other vectors associated with these structures? NONE

Midges                      Sand Flies                      Black Flies      Roaches

Rats                              Mice                              Squirrels

Other (please describe).

---



---



---

- 18. List any factors that contribute to the suitability of these structures to produce vectors?

They do not drain properly, water may stand in there for weeks.

---



---



---

**IV. Maintenance Concerns:**

- 19. Who is in charge of maintaining these structures?

Waste water, parks and Rec.

---



---



---

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes  No

If yes, what vegetation management efforts have been employed?

Mowing  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes  No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes  No, functioning as intended

If yes, please comment:

Debris that blows in or that kids throw in  
plugs the outlet all the time.  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

People over watering their yards.  
People washing their cars.  
Irrigation systems on lawns not working correctly  
or sprinkler heads shooting water on to the street  
instead of the yards.

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes

No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

*We inspect them weekly in the summer and larvicide them as needed.*

\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

*Larvicide the basins regularly during the summer.*

\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

*No. just started keeping records on these sites in 1999.*

\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

*We have no say in the use of these BMPs, but would like to have a say in the way they are designed and maintained.*

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Drainage has to be increased to Remove All  
water within the 72 hrs. This includes  
re-designing the drainage so it does not  
get plugged by all the debris.

31. Other comments that you would like to make.

If extended detention basins are built then  
monies have to be allocated to properly  
maintain them, including removal of debris,  
insects and control of mosquitoes.

Copy of original received in June 2000

### Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

#### I. Agency Information:

1. Name of Agency: Colorado Mosquito Control, Inc  
 Contact Person: Michael McGinnis  
 Address: 9999 Old Wadsworth Blvd.  
 City: Broomfield State: CO Zip: 80021  
 Email Address: COMOSQ@AOL.COM

2. What is the geographical area (square miles) covered by your agency?

1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 10 % Suburban 60 % Rural 30 %?

#### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes     No

7. Which types of stormwater control structures is your agency familiar with?

Retention & Detention Basins  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

50 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins  Extended Detention Basins  Bioswales
- Media Filters  Oil Water Separators
- Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

? months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Extended Retention  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

Culex X Anopheles \_\_\_\_\_ Aedes X Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges  Sand Flies  Black Flies  Roaches

Rats  Mice  Squirrels

Other (please describe).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

STANDING, STAGNANT, HIGH ORGANIC CONTENT  
WATER  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Various from STATE, CITY, Private  
MAINTENANCE  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year ?
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes
- No

If yes, what vegetation management efforts have been employed?

Various, mowing etc.

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes
- No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes
- No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

occasionally

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V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes  No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

*None*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

*On-going inspection and LARVICIDE APPLICATIONS*

\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

*Engineered properly for drainage in less than 5 days*

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: Neighborhood Inspection Services  
 Contact Person: Greg McKnight  
 Address: 200 W. 140th Ave Suite 304  
 City: Denver State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Email Address: \_\_\_\_\_

2. What is the geographical area (square miles) covered by your agency?

- 1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

- Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 25 % Suburban 65 % Rural 10 %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes       No

7. Which types of stormwater control structures is your agency familiar with?

gutters retaining ponds - and  
with siphons

8. What percentage of these structures are along freeways or roadways?  
40 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes No

11. Does your agency have BMPs in your district?

Yes No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins Extended Detention Basins Bioswales
- Media Filters Oil Water Separators
- Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
60 yrs months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes No

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

Culex  Anopheles \_\_\_\_\_ Aedes  Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

Lack of Routine Cleaning  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Urban Drainage  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes - No

If yes, what vegetation management efforts have been employed?

mechanical  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes

No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

use of traps  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

(general)  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

allow for ease of cleaning

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31. Other comments that you would like to make.

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# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: Tri-County Health Dept.  
 Contact Person: Monte Dextrich  
 Address: ~~5565 E. 130th~~ 4301 E. 72nd Ave  
 City: Commerce City State: CO Zip: 80022  
 Email Address: \_\_\_\_\_

2. What is the geographical area (square miles) covered by your agency?

- 1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

- Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 60 % Suburban \_\_\_\_\_ % Rural 40 %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes     No

7. Which types of stormwater control structures is your agency familiar with?

stormwater retention ponds  
(Infiltration Basins)

8. What percentage of these structures are along freeways or roadways?

25 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters            Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

~ 5 months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

- 15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Infiltration Basins  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- 16. Which mosquito species commonly utilize these structures?

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes X Others \_\_\_\_\_

- 17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches  
 Rats                              Mice                              Squirrels  
 Other (please describe):  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- 18. List any factors that contribute to the suitability of these structures to produce vectors?

holding water for long periods of time.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**IV. Maintenance Concerns:**

- 19. Who is in charge of maintaining these structures?

HOA's  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

Once every year

Once every two years

Once every five years

Once every ten years

Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes

No

If yes, what vegetation management efforts have been employed?

none

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes

No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes

No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

street run off from over watering yards, washing cars etc.

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes  No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

County Planning dept. has active role in the design.

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

none

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

increase surveillance of mosq. in areas of BMPs, treating BMPs with larvicides.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

not aware of.

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

no cattails or tall vegetation,  
drain completely dry every 7 days.

31. Other comments that you would like to make.

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## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Calvert County Mosquito Control Program

Contact Person: V. Wilson Freeland

Address: 175 Main Street

City: Prince Frederick State: Maryland Zip: 20678

Email Address: freelavw@co.cal.md.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban                       Suburban                       Rural

4. What percentage of the geographical area is

Urban 3 % Suburban 20-25 % Rural 72-77 %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes                       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes                       No

Print-it* Fax Note	7871	Date	4/30/01	# of pages	6
To	Marc Metzger A.D.	From	Wilson Freeland		
Co./Dept.		Co.	Calvert Co Govt		
Phone #		Phone #	410 535-6924		
Fax #	909-931-3456	Fax #	410 535 2181		

7. Which types of stormwater control structures is your agency familiar with?

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8. What percentage of these structures are along freeways or roadways?  
10\_\_%.

9. What purpose were these structures intended for?

- Storm/flood water control  
 Groundwater recharge  
 Stormwater pollutant removal  
 Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins  Extended Detention Basins  Bioswales

Media Filters  Oil Water Separators

Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?  
\_\_\_20yrs\_\_\_ months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

*Culex*   x   *Anopheles*   x   *Aedes*   x   Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges             Sand Flies             Black Flies    Roaches

Rats                 Mice                  Squirrels

Other (please describe).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

\_\_\_\_\_ Lack of natural predators.   Shallow standing water.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

  no one! \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes
- No

If yes, what vegetation management efforts have been employed?

None, In some cases where wetland vegetation has established in the structure under Maryland law the area is then considered wetlands and can not be disturbed.

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes
- No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes
- No, functioning as intended

If yes, please comment:

Silt accumulation is more of a problem than debris. We consider the structure a potential problem if water is held more than 5 days.

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Yes, In urban areas run off from refrigeration units add to the water level.

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\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

     We introduce mosquito fish into these structures      Structures that will not support fish are treated with either 30 or 150 day methoprene briquettes depending on where they are located. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

     Two employees monitor and treat these areas as a portion of their duties during the mosquito season. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

     Yes, Survey sheets, inspection reports, treatment reports and fish transfer forms.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Design the structures to allow for the survival of mosquito

fish

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31. Other comments that you would like to make.

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## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Maryland State Highway Administration

Contact Person: Stephen Udzenski

Address: 707 North Calvert Street, MS C-201

City: Baltimore State: MD Zip: 21202

Email Address: sudzenski@sha.state.md.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban ? % Suburban ? % Rural ?%

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

We use many different control structures with the majority of them being open ponds.

8. What percentage of these structures are along freeways or roadways?  
99%.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

- Yes       No

11. Does your agency have BMPs in your district?

- Yes       No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins       Extended Detention Basins       Bioswales
- Media Filters       Oil Water Separators
- Other (describe)

### **III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
20+years months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

- Yes       No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

All open ponds are perceived by the public to produce mosquitos. However our facilities have not been studied to substantiate this perception. Mosquito complaints are isolated in nature and are not consistent within the same locality; one neighbor complains and the next says that there is not a problem. Complaints are typically generated by people who are not in favor of a pond near them.

16. Which mosquito species commonly utilize these structures?

*Culex*    *Anopheles*    *Aedes*    Others we do not know

17. Are there other vectors associated with these structures?

Midges                       Sand Flies                       Black Flies                       Roaches

Rats                               Mice                               Squirrels

Other (please describe).

No studies have been made to determine the presence of vectors at our facilities. To our knowledge the facilities do not create a nuisance attraction.

18. List any factors that contribute to the suitability of these structures to produce vectors?

Standing water, dense brush and high grass

#### IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

The local SHA maintenance shops are responsible for all stormwater management facilities within their jurisdictions.

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes       No

If yes, what vegetation management efforts have been employed?

mowing and weed eradication

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes       No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes       No, functioning as intended

If yes, please comment:

A small percentage of the facilities are clogged or not functioning as intended at any given time.

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Groundwater seepage sometimes contributes to standing water in ponds.

## V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

Maryland Department of the Environment Stormwater Management Manual

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

To date we have received sporadic complaints of pest problem. These are treated on a case by case basis. Any potential for problems is minimized through simple standard maintenance practices such as mowing, trash collection, and weed eradication

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:  
General maintenance funds are used for pond maintenance. Vector control is not a targeted objective.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

To date, vector control has not been a priority issue within our state, since it has not been a problem in general.

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Grade dry ponds to limit pockets of standing water. Retention facilities should be designed to promote an array of wildlife that will contribute to the natural control vector production.

31. Other comments that you would like to make.

Maryland SHA is currently establishing design and maintenance guidelines to enhance the visual and functional quality of our SWM facilities.



Cyrus Lesser - RE: California BMPs. Please open asap

Page 1

From: "Metzger, Marco (DHS-DCDC)" <MMetzger@dhs.ca.gov>  
To: 'Cyrus Lesser' <LesserCR@mda.state.md.us>  
Date: 4/25/01 12:10PM  
Subject: RE: California BMPs. Please open asap

*To Marco Metzger  
909-937-3456*

Hi Cy

I did not receive a message from you, that is why I never responded. We don't have wordperfect, but I copied the survey and pasted it to this e-mail below. I think this should allow you to fill it out directly in this format and then just zip it back. Please type your answers in BOLD or in a different letter type if you use this e-mail

Otherwise, you can fax your printed copy to us at (909) 937-3456. Which ever is easier for you.

Thanks for everything and keep in touch

Marco

Marco E. Metzger, Ph.D.  
Associate Public Health Biologist  
Department of Health Services  
Vector-Borne Disease Section  
2151 Convention Center Way, Suite 218B  
Ontario, CA 92764-5429  
(909) 937-3448  
(909) 937-3456 FAX  
mmezger@dhs.ca.gov

Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey  
(If extra space is required, please feel free to attach additional pages)

I. Agency Information:

1. Name of Agency: Maryland Dept. of Agriculture

Contact Person: Cyrus R. Lesser

Address: 50 Harry S. Truman Parkway

City: Annapolis State: MD Zip: 21401

Email Address: lessercr@mda.state.md.us

2. What is the geographical area (square miles) covered by your agency?

- >1000
- 1-100
- 101-250
- 251-500

3. The geographical area covered by your agency is predominantly

- Urban
- Suburban
- Rural

4. What percentage of the geographical area is

Urban 15 % Suburban 35 % Rural 50 %?

II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes
- No

6. Is your agency required to monitor disease or nuisance vector production of

these structures?

- Yes
- No

7. Which types of stormwater control structures is your agency familiar with?

Stormwater Ponds, Stormwater Wetlands,  
Infiltration Designs (trenches and basis), Filtering Designs (sand filters),  
Dry Swales, Wet Swales

8. What percentage of these structures are along freeways or roadways?

Unknown %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes ... No

11. Does your agency have BMPs in your district?

Yes ... No

12. If yes, what types (refer to attached pamphlet)?

... Wet Basins ... Extended Detention Basins ...

Bioswales

... Media Filters ... Oil Water Separators

... Other (describe) All the above

III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?

15 ~~months~~ years.

14. Are these structures associated with mosquito production or other types of

vector or pest production? Yes

Yes ... No

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Stormwater wetlands, Wet swales, infiltration trenches

16. Which mosquito species commonly utilize these structures?

Culex X Anopheles X Aedes X Others Psorophora

17. Are there other vectors associated with these structures?

... Midges ... Sand Flies ... Black  
Files ... Roaches

... Squirrels ... Rats ... Mice

... Other (please describe).

18. List any factors that contribute to the suitability of these structures to

produce vectors?  
Shallow water, emergent vegetation, intermittent wet/dry,  
low or existent population of predators of mosquito larvae

IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

Usually a private developer, can be government agency.

20. How often are these structures typically cleared of debris, vegetation or silt?

- ... Once every six months
- ... Once every year
- ... Once every two years
- ... Once every five years                    **VARIABLE**
- ... Once every ten years
- ... Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes**
- ... No

If yes, what vegetation management efforts have been employed?

Mowing

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes      ... No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes      ... No, functioning as intended

If yes, please comment:

Stormwater wetlands are designed to hold shallow surface water

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

No

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V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

... Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest

problems?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

Stormwater ponds are monitored for mosquito larvae. Fish (Gambusia)  
are stocked, when possible. Larvicides (Bti, Bs and methoprene) are  
applied when larvae are present.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

Yes

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) ... Allow them to be built
- b) ... Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to

reduce the potential for vector production?  
Create pockets of deeper water for mosquito fish to survive  
and reproduce. Connect all areas in BMP via deep ditches  
to allow fish dispersal.

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

Maryland Department of Agriculture  
Mosquito Control Section  
6701 Lafayette Avenue  
Riverdale, MD 20737



## I. Agency Information:

1. Name of Agency: Maryland Department of Agriculture,  
Mosquito Control Section \_\_\_\_\_

Contact Person: Jeannine Dorothy

Address: 6701 Lafayette Avenue

City: Riverdale State: Maryland Zip: 20737

Email Address: skeetermd@erols.com

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 5 % Suburban 40 % Rural 55 %?

## V. Best Management Practice for Stormwater Retention and Treatment Structures

6. Has development in your district required the construction of stormwater control structures?

Yes       No

7. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

8. Which types of stormwater control structures is your agency familiar with?

Retention ponds  
Detention ponds  
Swales  
\_\_\_\_\_

9. What percentage of these structures are along freeways or roadways?  
\_\_\_\_\_ %.

10. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

15. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes    No

16. Does your agency have BMPs in your district?

Yes       No

17. If yes, what types (refer to attached pamphlet)?

- Wet Basins    Extended Detention Basins    Bioswales
- Media Filters?       Oil Water Separators
- Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

4. How long have these retention structures been in your area?

20 ~~months~~ / years.

5. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

6. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Detention ponds  
\_\_\_\_\_  
\_\_\_\_\_

7. Which mosquito species commonly utilize these structures?

*Oh, and Ochlerotatus*  
Culex   x   Anopheles   x   Aedes   x   Others Psorophora

8. Are there other vectors associated with these structures?

Midges  Sand Flies  Black Flies  Roaches

Rats  Mice  Squirrels

Other (please describe).

Don't know - we just do mosquitoes.  
\_\_\_\_\_  
\_\_\_\_\_

9. List any factors that contribute to the suitability of these structures to produce vectors?

Holding water in shallow areas with lots of vegetation;  
Areas that dry & flood; gradually sloping shorelines with  
lots of vegetation; areas rutted by maintenance equipment.  
\_\_\_\_\_

**X. Maintenance Concerns:**

11. Who is in charge of maintaining these structures?

Sometimes the County's stormwater agency, sometimes civic  
groups/homeowner, sometimes the developer & sometimes no  
one knows!  
\_\_\_\_\_  
\_\_\_\_\_

12. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

13. Is vegetation or weed overgrowth a maintenance problem?

- Yes
- No

If yes, what vegetation management efforts have been employed?

Don't know - some ponds are mowed right up to shoreline  
(often leaving ruts behind).

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14. Is debris or silt accumulation at these structures a maintenance problem?

- Yes
- No

15. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes
- No, functioning as intended

If yes, please comment:

"Dry" ponds are rarely dry. Ruts & puddles throughout, and  
low spots where grading was improperly done, hold water for  
several weeks to several months in some ponds.

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16. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Homeowner activities (watering lawns, washing cars) sometimes.

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XVII. Comments

18. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

We've tried to have input into the design of ponds, but we've had no luck. The State's Department of Natural Resources has plenty of input, though. The standard is now to create shallow highly vegetated "wetlands" which produce large populations of mosquitoes.

19. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

In communities participating in our mosquito control program (program is voluntary & citizens must request it...), we larvicide any ponds/swales in their neighborhood.

20. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

Hard to say, as treatment is done in conjunction with treatment of other wetland areas. In suburban areas, probably 1/10 of our resources go to stormwater structure treatment.

21. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

Yes. I've included a copy of a survey we did in 1989-1990 of mosquitoes breeding in stormwater ponds.

22. What position would you take if more of these BMPs were to be built in your jurisdiction?

- α)  Allow them to be built
- β)  Recommend not to build them
- χ)  Be involved in the design process

4. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

They are being built at a tremendous rate in Maryland. Our recommendations (which are not being taken...) are that the ponds should be retention basins with steeply sloping shorelines, little aquatic vegetation and capable of maintaining fish populations.

5. Other comments that you would like to make.

None of the designers or implementers believe that their ponds are creating mosquito habitat in brand new neighborhoods which often never had mosquito problems before. The ponds are often turned over to the local community once the development is finished. Most are ill-equipped to deal with any maintenance needed so many areas become completely overgrown. In our study, half of all the ponds checked bred 50% of the time.

Recvd by e-mail  
4/25/01

## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Minnesota Department of Transportation

Contact Person: Greg Busacker

Address: 395 John Ireland Blvd Mail Stop 620

City: St. Paul State: Minnesota Zip: 55155

Email Address greg.busacker@dot.state.mn.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       xxx >1000 (86,943 land & water) (79,617 land)

3. The geographical area covered by your agency is predominantly

Urban       Suburban       xxxx Rural

4. What percentage of the geographical area is

Urban 1.17% % Suburban < 1,0% % Rural 98% %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No



15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

ponds  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures? **This is likely, I do not have data based on collections.**

*Culex* x *Anopheles* \_\_\_\_\_ *Aedes* x Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      X Black Flies      Roaches  
Rats                              Mice                              Squirrels

Other (please describe).  
Black Flies in pipes  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

vegetation, quiet water  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Mn Dot Division of Maintenance or in some cases municipalities  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes                      No

If yes, what vegetation management efforts have been employed?

physical removal, mowing  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes                      No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes                       No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

no  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

Our standard plan sheets, Minnesota Pollution Control Agency's publication "Protecting Water Quality in Urban Areas"

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

none

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

none

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

no

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

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31. Other comments that you would like to make.

**\_\_\_\_\_ To date, stormwater BMP's have not been identified as a problem for disease vector production in Minnesota.** \_\_\_\_\_

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# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: Metropolitan Mosquito Control District (MMCD)  
 Contact Person: Joe Sanzone, Director  
 Address: 2099 University Avenue West  
 City: Saint Paul State: Minnesota Zip: 55104-3431  
 Email Address: JSanzone@visi.com

2. What is the geographical area (square miles) covered by your agency?

- 1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

- Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 15 % Suburban 40 % Rural 45 %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes       No

7. Which types of stormwater control structures is your agency familiar with?

primarily flood control (dykes etc.) and  
structures to keep the roads from flooding

8. What percentage of these structures are along freeways or roadways?

10 % ( ? )

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters            Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

\_\_\_\_\_ months/years. Most flood control structures have been in place for many years (≥ 10 years).

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

(BMPs)  
None

16. Which mosquito species commonly utilize these structures?  
(BMPs)

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe).

None that are the responsibility of the Metropolitan Mosquito Control District

18. List any factors that contribute to the suitability of these structures to produce vectors?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Various entities including the local cities, counties and Minnesota Department of Transportation

MMCD is not responsible for the actions referred to in questions 20-24.  
The best party to contact about them is the Minnesota Dept. of  
Transportation (general info 651-296-3000)

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes
- No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes
- No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes
- No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes

No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?  
(= BMPs)

None

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None

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---

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

None

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

a) Allow them to be built

b) Recommend not to build them

c) Be involved in the design process - at least be informed by the agency installing BMPs about their design so MMCD could evaluate their potential to generate nuisance and disease-transmitting mosquitoes.

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

We would desire that BMPs be constructed so that they would hold no standing water in which mosquitoes can breed.

31. Other comments that you would like to make.

The primary mosquito problems faced by MMCD are floodwater mosquitoes (*Aedes vexans* and similar species) that breed in temporary water associated with rains of 1 inch or more. This water is not typically associated with BMPs or other human-built structures.

A mosquito (*Cogullietti dia perturbans*) associated with cattails in another primary pest that MMCD deals with. It too is usually associated with more natural structures (wetlands, etc.).

The vector of LaCrosse encephalitis (*Aedes triseriatus*) breeds in artificial containers (tires, bird baths, rain gutters etc.) that hold water. This mosquito could potentially breed in a BMP <sup>device</sup> that held standing water.

**METROPOLITAN MOSQUITO  
CONTROL DISTRICT**

METRO COUNTIES GOVERNMENT CENTER  
2099 UNIVERSITY AVENUE WEST  
ST. PAUL, MINNESOTA 55104-3431  
(651) 645-9149

Dr. Marco E. Metzger  
Department of Health Services  
Vector-Borne Disease Section  
2151 Convention Center Way  
Suite 218B  
Ontario, CA 91764-5429

**Metzger, Marco (DHS-DCDC)**

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**From:** Nancy Read [nancread@pop.visi.com]  
**Sent:** Friday, March 16, 2001 7:21 PM  
**To:** mmetzger@dhs.ca.gov  
**Subject:** Minnesota BMP addition

Marco -

Here's just a small addition to the survey form you received from MMCD.

Part II -

Most of the stormwater management structures we've been involved with are "wetland/detention systems"; reconstructed wetlands that receive water before it reaches our famous lakes. There have been several of these systems added in the metro area that I'm aware of, and more are planned. For one of the first, Cedar Meadows, in the city of Minneapolis, we developed a joint IPM plan with the Minneapolis Park & Recreation Board, that involved their staff monitoring the site for larval mosquito production and then asking for treatment from MMCD when threshold is met. This particular detention wetland system has not been very productive of our chief pests, floodwater mosquitoes, because they were tending to act as permanent water holes with little vegetation (doesn't sound like they're doing their clean-up job either, but I haven't seen data on that). I think some of our field staff may have participated in local discussions of other constructed stormwater wetlands, but it has not resulted in any organizational agreements or policies. We're just expected to treat the sites as needed, as we would any wetland.

I think there are probably stormwater constructions such as media filters here, but since we have not historically paid much attention to Culex, we have not explored the mosquito potential of such constructions. We regularly check and treat the grassy roadside ditches which are very common, and often contain cattails as well.

Hope this is helpful. This is an area we have tried to get more involved in, but have not gotten very far yet.

- Nancy Read, Technical Services

Metropolitan Mosquito Control District  
2099 University Ave. West  
St. Paul, MN 55104  
651-643-8386 [nancread@visi.com](mailto:nancread@visi.com)



I. **Agency information**

1. Name of Agency: Multnomah County Vector Control

Contact Person: David Turner

Address: PO Box 83157

City: Portland State: Oregon Zip: 97203-0157

Email: [mcvector@teleport.com](mailto:mcvector@teleport.com)

2. What is the geographical area covered by agency ?  
251-500 sq. miles

3. The geographic area covered by agency is predominately  
Suburban

4. Urban 25% Suburban 50% Rural 25%

II. **Best Management Practice for Stormwater Retention and Treatment Structures.**

5. Has development in your district required the construction of stormwater control structures?  
Yes

6. Is your agency required to monitor disease or nuisance vector production of these structures?  
Yes

7. Which types of stormwater control structures is your agency familiar with?  
extended Detention Basins, Biofiltration Swales & Trenches, Infiltration Basins and wet basins.

8. What percentage of these structures are along freeways or roadways?  
20%

9. What purpose were these structures intended for?  
storm/flood water control  
stormwater pollutant removal  
other / Containment of hazardous material spill in roadway

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?  
Yes

11. Does your agency have BMPs in your district?  
Yes

12. If yes, what types (refer to attached pamphlet)?  
Bioswales  
Wet Basins  
Extended Detention Basins

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
6 Years

14. Are these structures associated with mosquito production or other types of vector or pest production?  
Yes

15. Which types of structures are most associated with mosquito production?  
Wet Basins, Biofiltration swales & trenches and infiltration basins.

16. Which mosquito species commonly utilize these structures?  
Culex, Anopheles, Aedes and Coquiletida (peturbans).

17. Are there other vectors associated with these structures?  
No

18. List any factors that contribute to the suitability of these structures to produce vectors?  
Poor vegetation management, accumulation of silt and other debris blocking drainage outlets, poorly maintained irrigation systems, water standing beyond 72 hours, overall very little effort is being put into the maintenance of these structure once construction is complete.

**IV. Maintenance Concerns**

19. Who is in charge of maintaining these structures?  
Oregon Department of Transportation, City of Portland Bureau of Environmental Services, East Multnomah Soil and Conservation District, Metro Regional Government, Cities of Gresham, Wood Village, Fairview and Troutdale and private property owners required to install detention facilities by various regulatory agencies in Multnomah County.

20. How often are these structures typically cleared of debris, vegetation or silt?  
Once every five years
21. Is vegetation or weed growth a problem?  
Yes
- If yes, what vegetation management efforts have been employed?  
Mowing, tilling, flooding and the use of herbicides have all been employed to control non-native plants prior to during and after construction.
22. Is debris or silt accumulation at these structures a maintenance problem?  
Yes
23. Are these structures retaining water longer than designed as a result of clogging or disrepair?  
Yes

If yes please comment:

Accumulations of silt, logs and vegetation often clog outlets. Large flooding events can deposit layers of clay soil slowing the percolation of stormwater. If silt removal is only done on a scheduled basis and not in response to flooding event the site may be capable of holding water for much longer periods of time than design specs may indicate. In the Willamette Valley beaver and nutria often dam culverts and ponds causing water to stand longer, and at higher levels than anticipated.

24. Are there any non - weather related practices, i.e., irrigation, that increase standing water in these structures?  
Irrigation, beaver and nutria blocking drainage.

## V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?  
No
26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?  
removal of silt, vegetation and debris from drainage outlets. Removal of beaver and nutria dams.
27. Describe the resources, if any your agency has dedicated to vector problems associated with BMPs:  
Control of mosquito larvae, source reduction and disease surveillance of adult mosquito populations produced in these sites.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs? Yes, daily activity reports from inspectors and entomologist. Also six years of data on these sites exist and can be summarized if needed.
29. What position would you take if more of these BMPs were to be built in your jurisdiction?  
Be involved in the design process
30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?  
Mosquito control districts must be involved in the design review and permit process. Accurate maps of facility locations, as well as description of hydrology of each facility should be provided to each local district. If sites wider than forty feet (effective swath width of most application equipment) are constructed, roads should be built close enough to the waters edge, to allow treatment of the site. Roads will need to be kept free of vegetation, and if road dead ends it should have a turn around area large enough for a truck and trailer. If entire water surface of site can not be treated from road, a ramp needs to be constructed to allow a boat, or ATV type vehicle access to the site. All sites should be inspected to insure they are performing to design specs, at least once a month. Maintenance checks should be performed after unusual weather events to insure all sites are still performing to design specs. Funding for control measures must be provided to the local vector control districts, by the agencies requiring construction of the facilities. If these sites are constructed, a comprehensive maintenance schedule and proper funding for control will go a long way toward reducing the threat of vector production from these types of sites.

**PORT OF PORTLAND**

Box 3529, Portland, Oregon 97208  
(503) 944-7000

**DATE: March 15, 2001**

Total number of pages, including  
this transmittal letter, is:

**FAX COVER SHEET****To:**

MARCO

**From:**

DOROTHY SPERRY

**Subject:** For review  
 As requested For action  
 For information For approval  
 Please discuss For signature  
 For comment**Remarks:**

THIS IS FOR OUR MARINE TERMINAL ONLY. I MAY SEND ANOTHER FOR PDX.

**DOROTHY**

**MESSAGE:** If you do not receive all the pages, please call as soon as possible, or call toll-free 800-547-8411 outside Oregon.

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DOCUMENT2

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: Port of Portland, OR  
 Contact Person: Dorothy Sperry  
 Address: Box 3529  
 City: Portland State: OR Zip: 97208  
 Email Address: sperryd@portptld.com

2. What is the geographical area (square miles) covered by your agency? 102 acres

- 1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

- Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 100 % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes     No

ONT VBDS

(909)937-3456

7. Which types of stormwater control structures is your agency familiar with?

All on your list  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?  
0 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes No

11. Does your agency have BMPs in your district?

Yes No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins    Extended Detention Basins    Bioswales
- Media Filters    Oil Water Separators
- Other (describe) Drain Inlet Inserts

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
\_\_\_\_\_ months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes No

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Only have o/w separators & catch basin filters - have not observed any vector problems.

16. Which mosquito species commonly utilize these structures? unknown

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures? unknown

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe).

18. List any factors that contribute to the suitability of these structures to produce vectors?

Only have o/w separators & catch basin filters - have not observed any vector problems.

IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

In-house maintenance crew (plumbers)

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months - catch basin fillers
- Once every year
- Once every two years - o/w separate
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes  No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes  No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes  No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

No

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes                  No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

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31. Other comments that you would like to make.

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**PORT OF PORTLAND**

Box 3529, Portland, Oregon 97208  
(503) 944-7881

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**FAX** cover sheet from Environmental Services Division

Date: March 16, 2001

To: Marco Metzger

Fax Number: 909 937 - 3456

From: Dorothy Sperry

Fax Number: 503-944-7353

Subject: Survey

Total Number of Pages  
(Including this one)

87

Message: If you do not receive all the pages, please call 503 503-944-7642 as soon as possible.

Mark,

The Survey I sent yesterday is for the Marine terminals. This one is for Portland International Airport. I did not fill out a survey for our industrial parks or other airports. Hope this information is useful.

Dorothy

## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Port of Portland, OR  
 Contact Person: Dorothy Sperry  
 Address: Box 3529  
 City: Portland State: OR Zip: 97208  
 Email Address: sperryd@portptld.com

2. What is the geographical area (square miles) covered by your agency? PDX  
 1-100     101-250     251-500     >1000
3. The geographical area covered by your agency is predominantly  
 Urban     Suburban     Rural
4. What percentage of the geographical area is  
 Urban 100 % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?  
 Yes     No
6. Is your agency required to monitor disease or nuisance vector production of these structures?  
 Yes     No

7. Which types of stormwater control structures is your agency familiar with?

Oil-Water Separators, Drain Inlet Inserts, Bioswales  
Catch Basins, Storm Sceptors, Vegetation Swales

8. What percentage of these structures are along freeways or roadways?

50 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins
- Extended Detention Basins
- Bioswales
- Media Filters
- Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

0-20 yrs months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

Bioswales or detention ponds  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

Culex X Anopheles X Aedes \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches  
Rats                              Mice                              Squirrels

Other (please describe).

not to our knowledge  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

Vegetation, low stormwater levels.  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Part of Portland, Multnomah County District  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

Once every year

Once every two years

Once every five years

Once every ten years

Never cleaned

*- Ponds - 3yrs*  
*- Catch Basins - 4yrs*  
*- Oil-Water separators - every year*

21. Is vegetation or weed overgrowth a maintenance problem?

Yes

No

If yes, what vegetation management efforts have been employed?

Removal  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes

No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes

No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

None to our knowledge  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

City of Portland  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

The port is currently not involved in reduction efforts of potential vector problems.  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None at this time.  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

There is no written documentation on vector production in the BMPs.  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Unable to make recommendations due to the  
limited problems with vectors to the best  
of our knowledge.

31. Other comments that you would like to make.

No comments.



**Metzger, Marco (DHS-DCDC)**

**From:** Bretsch, Katie [KATIEB@BES.CI.PORTLAND.OR.US]  
**Sent:** Tuesday, March 13, 2001 1:47 PM  
**To:** 'Metzger, Marco (DHS-DCDC)'  
**Cc:** Kliewer, Dave; 'WIRTH Chris M'; Braun, Mark; Dartsch, Linda; 'WICKHAM Lila A'  
**Subject:** Comments on Vector Issues and Stormwater Facilities

Marco,

Sorry it took me so long to get my comments to you. Hope I am not too late. I don't believe I've seen the survey in the fax machine, but I'll take another look.

The observation that I think it is most important to make about stormwater facility operations generally, is that facility design can't be considered in isolation from maintenance practices. It is the combination of facility design and maintenance practices that need to be evaluated. Whether the issue is spill response or vector control, designing with specific maintenance practices in mind is important for cost effective management.

As far as experience is concerned, we have 9,210 sumps and 6,507 sedimentation manholes, and over 90 stormwater facilities that could hold open, standing water. Some of the sumps have been in service for over 20 years. Sedimentation manholes for not as long, but certainly a large number have been in service for over ten years. Altogether, that represents a large number of "service years".

I am personally aware of only one public mosquito complaint traced to a sed manhole. That incident was associated with a local reduction in the leaf removal program the prior fall, and the problem was alleviated by normal facility cleaning. Even if my awareness is limited, and the actual number of mosquito complaints attributable to these facilities is 100 times this, it would still represent a very small incidence rate in relation to total service years.

Our target frequency for cleaning these facilities is once in five years, or better. At present, we are not achieving that rate, and some facilities are plugged. Our cleaning activity ratio is currently about half planned and half responsive. Responsive cleaning is performed based on public drainage complaints or internal reporting of a plugged facility. More planned cleaning is performed during the dry season, for efficiency reasons, and because complaints are obviously fewer. About ten of the open pond type facilities get routine monitoring and spraying with BT. The rest get less frequent attention. Both aerial and ground (backpack) spraying are used.

We are a water quality agency by mission. Protection of both surface and ground waters are included in our mission. We place a strong value on multi-objective management, and a very high value on protecting non-target species. Control of vector species to protect public health and avoid nuisance impacts is a standard collection system maintenance activity.

I certainly have no quantifiable evidence to support the idea that a multi-objective approach leads to higher costs. Total expenditures for all BES stormwater system operations and maintenance are \$22 million dollars annually, and total mosquito control expenditures are presently about \$80,000 annually.

Hope this is helpful. Please call if you have questions.

*Comments from  
Dave Turner  
3/15/2001*

→ *County vector does not fly any city facilities*

→ *more like \$20K annually*

Thanks.

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Katie Bretsch  
City of Portland, Environmental Services  
5001 N. Columbia Boulevard  
Portland, OR 97203-2098  
503.823.4390 (desk and voicemail)  
503.796.4860 (pager)  
503.823.2409 (fax)  
503.823.6205 (cell)

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: City of Portland Bureau of Environmental Services

Contact Person: Stormwater Program – Dawn Hottenroth

Address: 1120 SW 5<sup>th</sup> Avenue, Room 1000

City: Portland State: OR Zip: 97204-1972

Email Address: dawnh@bes.ci.portland.or.us

2. What is the geographical area (square miles) covered by your agency?

1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 30 % Suburban 60 % Rural 10 %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

Sumps, Sediment Manholes, Ponds, Wetlands, Swales, Stormwater Planters, Infiltration basins, CDS, Stormceptors, Stormfilters, Downstream Defender, lynch catchbasins,

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

80 %.

9. What purpose were these structures intended for?

Storm/flood water control  
Groundwater recharge  
 Stormwater pollutant removal  
 Other Flow rate control

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes      No

11. Does your agency have BMPs in your district?

Yes      No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins     Extended Detention Basins  Bioswales

Media Filters     Oil Water Separators

Other (describe) Wetlands, Stormceptors, Stormfilters, CDS, Sediment Manholes, sumps—

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?  
\_\_\_\_\_ \* Varies \_\_\_\_\_ months/years. \* Some like sumps upto 40 or so years, Water quality facilities 10 or less years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

— Yes      No \_\_\_\_\_ Rarely they are found to breed mosquitos.

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Lynch Style catch basins, Ponds and Wetlands.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes*  \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches  
— Rats (Some)      \_\_\_\_\_ Mice                      Squirrels

— Other (please describe).

We also get some goose and beaver visitation to our sites – they can be hosts for other vectors. \_\_\_\_\_

\_\_\_\_\_ Also human nuisance and public health issues. \_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

\_\_\_\_\_ Water standing for more than 48 hours and clogged conveyance or treatment orifices. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

City Maintenance Crews \_\_\_\_\_ and Private Property owners for private  
facilities \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

Once every year

Once every two years

Once every five years \_\_\_\_\_ Varies based on facility

Once every ten years

Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

— Yes                      No

If yes, what vegetation management efforts have been employed?

Hand or mechanical removal

Aggressive beneficial

plantings \_\_\_\_\_

Limited spot

spraying \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

— Yes                      No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

— Yes                      No, functioning as intended

If yes, please comment:

Sometimes due to delayed  
maintenance  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Yes- but location  
specific  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes                      No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

Stormwater management manual – available on [www.enviro.ci.portland.or.us](http://www.enviro.ci.portland.or.us)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

Design for appropriate  
drawdown  
Preventative mosquitocide  
application  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

We contract with County Vector control for mosquito screening and rat control.

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

Yes - City maintenance and County Vector Control

Records

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Better design and maintenance. We had County Vector Control staff review our previous Stormwater facility design guidance manuals

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31. Other comments that you would like to make.

These facilities always have the potential to breed mosquitos, but no more than privately held defunct swimming pools, ponds, wet flower pots or waste tires.

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## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Oregon Department of Transportation  
 Contact Person: Jeff Moore  
 Address: 123 NW Flanders  
 City: Portland State: Oregon Zip: 97209  
 Email Address: Jeffrey.T.MOORE@odot.state.or.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 10 % Suburban 20 % Rural 70 %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

<del>Retention Basins</del>	<del>Media Filters</del>
<del>Biofiltration Swales &amp; Strips</del>	<del>Wet Basins</del>
<del>Oil Water Separators</del>	<del>Drain Inlet Inserts</del>
<del>CDS</del>	

8. What percentage of these structures are along freeways or roadways?

100 %

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes No

11. Does your agency have BMPs in your district?

Yes No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins  Extended Detention Basins  Bioswales

Media Filters  Oil Water Separators

Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?

1-5 months  years

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes No (wet ponds)

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

Wet Basins  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes \_\_\_\_\_ Others ?

17. Are there other vectors associated with these structures?

Midges \_\_\_\_\_ Sand Flies \_\_\_\_\_ Black Flies \_\_\_\_\_ Roaches \_\_\_\_\_  
Rats \_\_\_\_\_ Mice \_\_\_\_\_ Squirrels \_\_\_\_\_

Other (please describe)

Natria, ducks, birds  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

standing water  
excess brush  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

ODOT Highway maintenance workers  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes      No

If yes, what vegetation management efforts have been employed?

Hand pulling cat tails

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes      No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes      No, functioning as intended

If yes, please comment:

Drains for wet ponds have clogged with silt & debris in the past.

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Generally no, although irrigation from adjacent property has occasionally created siltation problems.

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

ODOT stormwater design manual  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

Some of the wet ponds are sprayed with pesticides by County vector control.  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

Vector control is not addressed in ODOT BMPs  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Keep standing water to a minimum  
depending on the specific facility; vegetation  
control can be an issue

31. Other comments that you would like to make.

Appropriate maintenance needs to be developed  
for each specific facility.

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: Austin/Travis County Health Human Services Department  
Contact Person: A. Barrie Turano, R.S., Supervisor, Rodent & Vector Program  
Address: 15 Waller Street  
City: Austin State: Texas Zip: 78702  
Email Address: Barrie.Turano@ci.Austin.Tx.US

2. What is the geographical area (square miles) covered by your agency?  
1-100            101-250            251-500            X >1000 [1,024]

3. The geographical area covered by your agency is predominantly  
Urban            X Suburban            Rural

4. What percentage of the geographical area is  
Urban 25 %            Suburban 45%            Rural 30%?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

X Yes            No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes            X No [Agency responds in individual complaints involving mosquitoes]

7. Which types of stormwater control structures is your agency familiar with?

Drainage /runoffs                      Retention ponds

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8. What percentage of these structures are along freeways or roadways?  
85-90%.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- [All of the above]
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes                      No [Watershed Protection Department may identify with BMP's, but not the Rodent & Vector Program].

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters                      Oil Water Separators

Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?  
[For years] months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

X Yes      No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

Old tires; buckets, pots, pans, plants; creeks that don't have a steady flow; retention ponds; \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

*Culex*   X   *Anopheles*   X   *Aedes*   X   Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches  
X Rats                              X Mice                              Squirrels

Other (please describe).  
Harborage areas.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors? Dark & quiet; no movement of the water; weeds.

\_\_\_\_\_  
\_\_\_\_\_

#### IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

Homeowners; property owners; homeowner associations; Municipal Utility Districts;  
City – some retention ponds; State Roads.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months [Ideally]
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes                       No

If yes, what vegetation management efforts have been employed?

Routine or complaint driven cutting of tall weeds and grass.

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes                       No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes                       No, functioning as intended [No direct knowledge – only respond on complaint basis]

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Unknown

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes                      X No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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---

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

Education of property owners; applying larvicides and adulticides when appropriate; removing standing water.

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

NA

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

NA

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process [Work with sister City Departments on identifying locations of existing and future retention or runoff ponds]

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?  
R&V Program plans to survey, map and identify mosquito breeding areas within its jurisdiction.

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31. Other comments that you would like to make.  
Please keep us informed of summary data obtained and plans for mosquito control in structures of this kind.

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**Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey**  
(If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

1. Name of Agency: City of Austin Watershed Protection and Development  
Review Department

Contact Person: Patrick Hartigan

Address: P.O. Box 1088

City: Austin State: TX Zip: 78701

Email Address: pat.hartigan@ci.austin.tx.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       501-1000       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is (roughly)

Urban 50 % Suburban 50 % Rural \_\_\_\_\_ %?

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No      ? Nuisance conditions are part of the pond inspection criteria, which can include presence of mosquitoes and other problems

7. Which types of stormwater control structures is your agency familiar with?

**Dry detention, sand filtration, retention-irrigation, wet ponds, wetlands, vegetative filter strips, vegetated swales (“bioswales”), oil-grit separators** \_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?  
\_\_\_\_\_%. **Don’t have an accurate count, but estimate less than 10% of the 3500+ stormwater ponds in Austin are for roads.**

9. What purpose were these structures intended for?

**Storm/flood water control**

Groundwater recharge

**Stormwater pollutant removal**

Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

**Yes**     **No**

11. Does your agency have BMPs in your district?

**Yes**             **No**

12. If yes, what types (refer to attached pamphlet)?

**Wet Basins**  **Extended Detention Basins**             **Bioswales**

**Media Filters**             **Oil Water Separators**

**Other (describe) retention-irrigation, impervious cover limits, stream setback requirements, erosion and sedimentation controls for construction sites, public education, integrated pest management (IPM), ...**

### **III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

\_\_\_\_\_ months/years. **Most structures function as *detention* systems, not *retention*. Flood control detention basins have been required for > 20 years, water quality BMPs (mostly sand filtration systems) about 15 years.**

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes No **If not maintained or operated properly, mosquito problems can and do occur**

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

Not aware of any particular type – any structure that is not draining properly is considered problematic.

16. Which mosquito species commonly utilize these structures?

*Culex* X *Anopheles* X *Aedes* ? Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

**Not aware that any of the following are specifically noted as problems during inspection and maintenance activities.**

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe).

Fire Ants (non-native *Solenopsis invicta*) – large numbers can sometimes be found in disturbed or compacted areas near ponds, or in debris piles washed into ponds – painful encounters with these masses is an experience not soon forgotten.

18. List any factors that contribute to the suitability of these structures to produce vectors?

Stagnant pools of water

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Ponds in residential developments typically are maintained by the City of Austin whereas those servicing private commercial development are maintained by the property owner.

20. How often are these structures typically cleared of debris, vegetation or silt?

City's maintenance requirements are:

- All ponds - vegetation around ponds to be mowed every 3 months
- All ponds - trash and debris to be removed every 6 months, or as necessary
- All ponds - ponds are to be inspected annually to see if repairs are necessary
- Detention ponds – corrective maintenance is required any time drawdown time does not occur within 96 hours
- Detention ponds – silt should be remove when the accumulation exceeds 4- 6 inches (depends on specific design)
- Filtration ponds – corrective maintenance is required any time drawdown time does not occur within 36 hours
- Wet ponds – sediment shall be removed if more than 10% of the volume is lost; sediment buildup shall be checked at least every 3-6 years.

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes            No    ? **Can be if routine maintenance is not performed, if have a wet year with rapid vegetation growth, or pond does not function properly (e.g., has "dead storage" areas).**

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes            No    ? **Can be a problem, especially for sand filtration systems, if the pond is put "on line" while active construction is still occurring in drainage area (due to high sediment loads).**

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes            No, functioning as intended    ? **Appears that most are functioning properly, but occasional clogging problems due occur.**

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

Not that I'm aware of.

## V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

**City of Austin Drainage Criteria Manual, City of Austin Environmental Criteria Manual – can be viewed from City's web site – look under "Austin Technical Manuals" at <http://www.ci.austin.tx.us/development/techmanlead.htm>**

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

**Not sure I understand the question – City conducts inspections, maintenance, and responds to citizen complaints; latter often a result of nuisance or unsightly conditions. Wet ponds are stocked with gambusia, which are very effective at controlling mosquito populations.**

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

**Department has a large inspection and maintenance program in place, but I was unable to locate the personnel and budget information for this survey (can still do so at a later date if so desired).**

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

Not aware of any.

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  **Allow them to be built**
- b)  Recommend not to build them
- c)  **Be involved in the design process**

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Require designs that:

- do not have excessive drawdown times (detention and filtration systems)
- are shaped such that “dead storage” areas are not created (areas off the main flow path that tend to become stagnant) – this is especially true for wet ponds
- are not extremely shallow
- are graded properly to prevent unwanted ponding
- do not rely on small orifices to release water – these can be easily clogged by trash and debris; diameters of 6” or more are preferred.

31. Other comments that you would like to make.

**It should be acknowledged that there are many areas other than stormwater management ponds where mosquitoes breed during and after periods of rainfall in Austin. Austin’s warm, humid climate and generally poor draining soils provide abundant opportunities for mosquitoes to thrive, regardless of the presence or absence of stormwater facilities. Private residences are well-known problem areas due to standing water (clogged gutters, poorly draining yards, bird baths, etc.). Austin creeks are also a primary source as most flow only intermittently and have many ephemeral pools where water ponds up for days to weeks at a time. Austin acknowledges that stormwater facilities can become nuisance problems, and has adopted criteria to minimize those problems. Because of the tremendous impacts of uncontrolled stormwater on public health, safety, property, and the environment, the need for stormwater controls in Austin is unquestioned.**

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**Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey**  
(If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

1. Name of Agency: TxDOT- Dallas
- Contact Person: Jay McCurley
- Address: P O Box 133067
- City: Dallas State: TX Zip: 75149
- Email Address: JMCCURL@DOT.STATE.TX.US

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 20 % Suburban 20 % Rural 60 %?

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

  Dry ponds    
  Wet ponds    
  Vegetative strips  

8. What percentage of these structures are along freeways or roadways?

  >5   %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes    No

11. Does your agency have BMPs in your district?

Yes            No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters            Oil Water Separators

Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?

  2-5 years   months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes    No ( **don't know** )

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

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16. Which mosquito species commonly utilize these structures?

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others **\_(Don't Know)**

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches

Rats                      Mice                      Squirrels

Other (please describe).

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18. List any factors that contribute to the suitability of these structures to produce vectors?

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**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

**District Maintenance Foremen** \_\_\_\_\_

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20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

Once every year

Once every two years

Once every five years

Once every ten years

Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes                       No

If yes, what vegetation management efforts have been employed?

mowing, brush removal

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes                       No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes                       No, functioning as intended

If yes, please comment:

ponds no but sand filters yes

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

no

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes                      No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

Not yet but soon design and implementation

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

none

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

none

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

no

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) **X**Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

**\_\_\_\_\_ designs should not hold standing water for extended times. Newer designs should provide for ease of maintenance, including vector controls.**

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey**  
(If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

1. Name of Agency: Virginia Department of Health – Office of Epidemiology

Contact Person: Dr. David N. Gaines

Address: 1500 East Main Street, Room 113, P.O. Box 2448

City: Richmond State: Virginia Zip: 23218

Email Address: dgaines@vdh.state.va.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural 97% of the state is rural

4. What percentage of the geographical area is

Urban \_\_\_\_\_ % Suburban \_\_\_\_\_ % Rural 97 %? 97% of the state is rural.

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

   I am not sure what the different types are called, but our agency does not     
   deal with stormwater control structures \_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

   I do not know, but probably a lot of them, I have also seen many \_\_\_\_\_  
   associated with parking lots. \_\_\_\_\_%

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes             No

11. Does your agency have BMPs in your district?

Our district is the state so I am certain they are out there.

Yes             No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters            Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

   I do not know, but some must be at least 10 years old. \_\_\_\_\_ months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

X Yes                  No

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

\_\_\_ I am not sure. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?  
Probably any of the following genera.

*Culex*   X      *Anopheles*   X      *Aedes*   X      Others   X  

17. Are there other vectors associated with these structures?

Midges                  Sand Flies                  Black Flies                  Roaches  
Rats                          Mice                          Squirrels

Other (please describe). I do not know.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

\_\_\_ Structures may hold water long enough for mosquito populations to \_\_\_  
\_\_\_ breed, but not for long enough to support predator populations that \_\_\_  
\_\_\_ would control the mosquito larvae. Emergent vegetation and algae \_\_\_  
\_\_\_ may also promote mosquito populations by providing larvae with \_\_\_  
\_\_\_ refuge or cover from predators. \_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

\_\_\_ I do not know. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

I do not know.

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes, Probably       No

If yes, what vegetation management efforts have been employed?

I do not know. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes, Probably       No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?  I do not know.

Yes      No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

I do not know. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes            X No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

\_\_\_ We encourage communities to adopt mosquito surveillance programs \_\_\_  
\_\_\_ so they can identify, target and control their problem mosquito \_\_\_  
\_\_\_ populations. \_\_\_

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

\_\_\_ None. \_\_\_

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

\_\_\_ None. \_\_\_

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) X Allow them to be built
- b)    Recommend not to build them
- c) X Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

I would need to study each type of BMP and its associated mosquito problem before making recommendations for design changes.

31. Other comments that you would like to make.

Sorry I could not be of more help.

## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Virginia Transportation Research Council

Contact Person: Michael Fitch

Address: 530 Edgemont Road

City: Charlottesville State: VA Zip: 22903

Email Address: mfitch@virginia.edu

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 20 % Suburban 30 % Rural 50 %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?  
detention basins, grass swales, bioretention areas, ultra urban bmps

8. What percentage of these structures are along freeways or roadways?  
100 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes    No

11. Does your agency have BMPs in your district?

Yes            No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins     Extended Detention Basins     Bioswales

Media Filters             Oil Water Separators

Other (describe) \_\_\_\_\_

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?  
8 years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes     No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

detention basins  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

*Culex* x *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      X Black Flies                      Roaches

Rats                              Mice                              Squirrels

Other (please describe).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

wet, dense vegetation along the edges  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

VDOT  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes                  No

If yes, what vegetation management efforts have been employed?

None that I am aware of.

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes                  No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes                   No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

No.

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes       No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

None to date

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None to date

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No.

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

increase water depth, increase slope angle on edges, thin vegetation, add sprinkler systems

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31. Other comments that you would like to make.

Thanks Marco.

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## Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

### I. Agency Information:

1. Name of Agency: Alexandria Health Dept. (Environmental Health)

Contact Person: Joseph W. Fiander

Address: 517 N. St. Asaph St.

City: Alexandria State: VA Zip: 22314

Email Address: jfiander@vdh.state.va.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 30 % Suburban 70 % Rural \_\_\_\_\_ %?

### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No (not yet)

7. Which types of stormwater control structures is your agency familiar with?

storm water retention ponds  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

unk. %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins  Extended Detention Basins  Bioswales

Media Filters  Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

several months years

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No unk.

15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

unknown

16. Which mosquito species commonly utilize these structures? *unk.*

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures? *unk.*

Midges                       Sand Flies                       Black Flies     Roaches

Rats                               Mice                               Squirrels

Other (please describe).

18. List any factors that contribute to the suitability of these structures to produce vectors?

standing water

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

Transportation & Environmental Services, Maintenance Division

Ray Wiley : Maintenance Division Chief

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years *unk.*
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

- Yes
- No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

- Yes
- No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

- Yes
- No, functioning as intended

If yes, please comment:

*Many hold water permanently*

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

*No, only urban run-off*

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes  No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

*none, as yet*  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

*City owned properties will be treated with larvicides or suffocants, as needed.*  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

*Not yet*  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a)  Allow them to be built
- b)  Recommend not to build them
- c)  Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

*Design should ensure water retention no longer than 4-5 days.*

31. Other comments that you would like to make.

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# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: \_\_\_\_\_ **City of Alexandria** \_\_\_\_\_  
Contact Person: \_\_\_\_\_ **Bill Hicks** \_\_\_\_\_  
Address: \_\_\_\_\_ **301 King St., City Hall, Room 3900** \_\_\_\_\_  
City: \_\_\_\_\_ **Alexandria** \_\_\_\_\_ State: \_\_\_\_\_ **VA** \_\_\_\_\_ Zip: \_\_\_\_\_ **22314**  
Email Address: \_\_\_\_\_ **bill.hicks@ci.alexandria.va.us** \_\_\_\_\_

2. What is the geographical area (square miles) covered by your agency?

**1-100**

3. The geographical area covered by your agency is predominantly

**Urban**

4. What percentage of the geographical area is

Urban 100 % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

**Yes**

6. Is your agency required to monitor disease or nuisance vector production of these structures?

**Yes**

7. Which types of stormwater control structures is your agency familiar with?

     **Dentention (underground) detention ponds, underground ultra urban BMP's i.e. sand filters, bio-retention filters, hydro-dynamic structures (Stormceptors Vortechinics, etc)** \_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?  
\_\_\_\_\_ %.

9. What purpose were these structures intended for?

Storm/flood water control **Some**

Stormwater pollutant removal **-BMPS**

Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

**Yes**

11. Does your agency have BMPs in your district?

**Yes**

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters                      Oil Water Separators

Other (describe)      Sand Filters, Bio Retention Filters

### **III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
     **3 years**

14. Are these structures associated with mosquito production or other types of vector or pest production?

**Yes    No**

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

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16. Which mosquito species commonly utilize these structures?

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches

Rats                              Mice                              Squirrels

Other (please describe).

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18. List any factors that contribute to the suitability of these structures to produce vectors?

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**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

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20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes                  No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes                  No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes                  No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

**X YES**

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

City ordinance, & BMP Manual  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

We will be looking at larvicide in conjunction with the Dept of Health's efforts to control mosquitos relating to the West Nile Virus  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) **X** Allow them to be built
- b) **X** Recommend not to build them
- c) **X** Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Underground Filter Systems  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey**  
(If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

1. Name of Agency:  Maintenance and Stormwater Management Division  
 Department of Public Works and Environmental Services  
Contact Person:  Scott R. St.Clair, Director  
Address:  10635 West Drive  
City:  Fairfax State:  Virginia Zip:  22030  
Email Address:  scott.stclair.co.fairfax.us

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 25 % Suburban 50 % Rural 25 %?

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

**Yes, Since 1984**       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       **No**

7. Which types of stormwater control structures is your agency familiar with?

Extended Dry Ponds and permanent water surface ponds  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

10 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes       No

11. Does your agency have BMPs in your district?

Yes       No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins       Extended Detention Basins       Bioswales

Media Filters       Oil Water Separators

Other (describe) Sand Filters, Rain Gardens, Stormseptors

### III. Vector Production Associated with the Stormwater Retention Structures.

13. How long have these retention structures been in your area?

Since 1984 months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

**None, there are wetlands and flood plains throughout our County that have 1,000's of acres of mosquito habitat** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

**I have no idea of the species.**

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

**Do not know**

Midges                      Sand Flies                      Black Flies      Roaches

Rats                      Mice                      Squirrels

Other (please describe).  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

**Retention and detention ponds will hold natural debris and leaves for a habitat for those vectors** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### **IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

**Public Works maintains about 800 SWM/BMP's, and 1,600 are maintained by privately property owners**

20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

**XXX Once every year for debris and blockages at the low-flow orifice**

Once every two years

**XXX Once every five years for silt dependent upon a siltation study and being more than 50% of the BMP volume**

Once every ten years

Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

**XXX Yes**                      No

If yes, what vegetation management efforts have been employed?

**We mow the vegetation on the dam embankment and 20 feet at the toe of slope. We have a pilot program where the basin floor is left to grow natural until the 50% BMP volume is reached, then we have to remove the siltation**

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22. Is debris or silt accumulation at these structures a maintenance problem?

**XXX Yes**                      No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

**XXX Yes**                      No, functioning as intended

If yes, please comment:

**Most blockage is created from the natural watersheds and from the vegetation in the pond floor.**

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

**No, but there are numerous pond with high ground water that cause standing water.** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

**XXX Yes**                      **No**

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

**Fairfax County has a design Manual called the Public Facilities. The cost is about \$65. for the volumes.** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

**None – public education and a complaint investigation of any call about standing water in SWM/BMP facilities the County maintains.** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

**None** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

**I know of none** \_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

**BMP's are required to be constructed for all new developments, roads, etc....as part of the County's water quality regulations in meeting the Federal, State and local mandated water quality efforts.**

- a) Allow them to be built
- b) Recommend not to build them
- c) **XXXX** Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

**None – The water quality/removal efficiency is a function of the detention time and the orifice opening will be determined. Provide a debris cage that can be easily cleaned and maintained with a quick visual inspection rather than a buried filter medium and with no filter cloth.**

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31. Other comments that you would like to make.

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- Health Administration  
(608) 785-9872
- Environmental Health  
(608) 785-9771
- Health Education  
(608) 785-9872
- Laboratory  
(608) 785-9872



300 4th Street North • La Crosse, WI 54601-3228

- Nursing  
(608) 785-9723
- Vector Control  
(608) 785-9872
- WIC/Nutrition Services  
(608) 785-9865
- TDD  
(608) 785-9787
- FAX  
(608) 785-9846

1. La Crosse County Health Department  
Dave Geske  
300 4<sup>th</sup> St N  
La Crosse WI 54601
2. 483 square miles for nuisance control and in excess of 1,000 square miles for mosquito-borne disease control.
3. The majority of storm water retention areas that this program addresses are located in urban and suburban areas. The agency coverage area is primarily rural.
5. Yes
6. Yes
7. Roadside ditches, Interstate and roadway drainage systems, flood protection structures (Pammel Creek Project), and residential area holding ponds (for erosion control).
8. Over 90%
9. Storm/flood water control
13. 22 years
14. Yes
15. Roadside and Interstate drainage systems and ditches.
16. Vast majority Aedes vexans - some Culex.
17. No
18. Blockage creating ponding in ditches or sites without a drainage outlet. Along Interstate large areas are designed to pond or to have drainage to low land sites where water ponds and creates very productive mosquito habitat.



*"To improve the quality of life and health of all people in La Crosse County."*

*An Equal Opportunity Employer*





### Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

#### I. Agency Information:

1. Name of Agency: City of La Crosse, WI  
Contact Person: Patrick Caffrey - DPW  
Address: 400 La Crosse St.  
City: La Crosse State: WI Zip: 54601  
Email Address: caffrey@cityoflacrosse.org

2. What is the geographical area (square miles) covered by your agency?

1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 60 % Suburban 30 % Rural 10 %?

#### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes     No

7. Which types of stormwater control structures is your agency familiar with?

Detention basins  
Grass

8. What percentage of these structures are along freeways or roadways?

25 %

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes

No

Not yet by city - some have been required in developments

12. If yes, what types (refer to attached pamphlet)?

Wet Basins

Extended Detention Basins

Bioswales

Media Filters

Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

5 months  years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

No complaints  
not monitored

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures? unknown

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures? unknown

Midges \_\_\_\_\_ Sand Flies \_\_\_\_\_ Black Flies \_\_\_\_\_ Roaches \_\_\_\_\_

Rats \_\_\_\_\_ Mice \_\_\_\_\_ Squirrels \_\_\_\_\_

Other (please describe):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

some by city  
some by property owners

20. How often are these structures typically cleared of debris, vegetation or silt?

Once every six months

Once every year

Once every two years

Once every five years

Once every ten years

Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes

No

IN SOME

If yes, what vegetation management efforts have been employed?

Cutting  
Waters are mowed regularly

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes

No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes

No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

No  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes

No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

Avoid small shallow  
wet ponds

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey**  
 (If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

1. Name of Agency: DEPARTMENT OF COMMERCE  
 Contact Person: LYDIA DOCKEN  
 Address: 4003 N KINNEY COLLEC RD  
 City: La Crosse State: WI Zip: 54601  
 Email Address: L.Docken@Commerce.State.WI.US

2. What is the geographical area (square miles) covered by your agency?

- 1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

- Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban \_\_\_\_\_ % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

- Yes       No       Sometimes

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes       No

7. Which types of stormwater control structures is your agency familiar with?

infiltration, retention.  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

<10 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins  Extended Detention Basins  Bioswales
- Media Filters  Oil Water Separators
- Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

5 yrs months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

16. Which mosquito species commonly utilize these structures?

Culex X Anopheles \_\_\_\_\_ Aedes \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

sitting

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

IV. Maintenance Concerns:

19. Who is in charge of maintaining these structures?

Municipalities

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

Unknown

21. Is vegetation or weed overgrowth a maintenance problem?

Yes No Unknown

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

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V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes    No    Some

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

Comm 82.36  
Comm #21

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

Subsurface.

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

None.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process  
by writing rules.

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

subsurface + maintenance  
\_\_\_\_\_  
\_\_\_\_\_

31. Other comments that you would like to make.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Received Dec 18, 2000

### Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

#### I. Agency Information:

1. Name of Agency: City of Milwaukee - Dept. of Neighborhood Services  
 Contact Person: Don Schaewe  
 Address: 1626 W. Fond du Lac Av.  
 City: Milwaukee State: WI Zip: 53205  
 Email Address: D.SCHAE @ ci.mil.wi.us

2. What is the geographical area (square miles) covered by your agency?

- 1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

- Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 100 % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

#### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

- Yes     No

7. Which types of stormwater control structures is your agency familiar with?

Deep Tunnel Project  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?

0 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No  Unknown - different agency

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins  Extended Detention Basins  Bioswales
- Media Filters  Oil Water Separators
- Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

10 months  years

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes   No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

16. Which mosquito species commonly utilize these structures? *N/A*

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges Sand Flies Black Flies Roaches

Rats Mice Squirrels

Other (please describe) *N/A*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

18. List any factors that contribute to the suitability of these structures to produce vectors?

*N/A*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

*Milwaukee Metropolitan Sewerage District*

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

*Unknown*

21. Is vegetation or weed overgrowth a maintenance problem?

Yes

No

If yes, what vegetation management efforts have been employed?

*N/A*

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes

No

*Unknown*

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes

No, functioning as intended

*N/A*

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

*No*

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V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes

No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

N/A

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

N/A

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

N/A

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

N/A - not involved.

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

N/A

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31. Other comments that you would like to make.

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Post-it Fax Note	7671	Date	2/27/01	# of pages	6
To	MARCO METZGER	From	TIM THUR		
Co./Dept.	HEALTH SERVICES	Co.	CITY OF MILWAUKEE		
Phone #	(909) 937-3440	Phone #	(414) 286-2463		
Fax #	(909) 937-3456	Fax #	(414) 286-0513		

### Caltrans BMP Retrofit Pilot St

(If extra space is required, please feel free to attach additional pages)

#### I. Agency Information:

1. Name of Agency: CITY OF MILWAUKEE - DEPT. OF PUBLIC WORKS

Contact Person: TIM THUR

Address: 841 N. BROADWAY, ROOM 820

City: MILWAUKEE State: WI Zip: 53202

Email Address: TTHUR@MPW.NET

2. What is the geographical area (square miles) covered by your agency?

1-100     101-250     251-500     >1000

3. The geographical area covered by your agency is predominantly

Urban     Suburban     Rural

4. What percentage of the geographical area is

Urban 90 % Suburban 10 % Rural      %?

#### II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

Yes     No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes     No

7. Which types of stormwater control structures is your agency familiar with?

DETENTION & RETENTION PONDS; GRASSED SWALES;  
UNDERGROUND STORAGE; IN-LINE TREATMENT DEVICES;  
ROOFTOP DETENTION; MULTI-CHAMBER TREATMENT DEVICES

8. What percentage of these structures are along freeways or roadways?  
5 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins    Extended Detention Basins    Bioswales
- Media Filters            Oil Water Separators

Other (describe) SEE LIST IN QUESTION #7

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
9 YEARS month/year.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes  No

- 15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

NO KNOWLEDGE THAT THERE HAS BEEN ANY STUDY  
OF THIS FOR OUR AREA

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- 16. Which mosquito species commonly utilize these structures? *No INFORMATION*

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ *Others* \_\_\_\_\_

- 17. Are there other vectors associated with these structures? *No INFORMATION*

*Midges*                      *Sand Flies*                      *Black Flies*      *Roaches*

*Rats*                              *Mice*                              *Squirrels*

Other (please describe).

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- 18. List any factors that contribute to the suitability of these structures to produce vectors?

SHALLOW WATER AND PERIODIC FLOODING

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**IV. Maintenance Concerns:**

- 19. Who is in charge of maintaining these structures?

THE OWNER IS RESPONSIBLE FOR MAINTENANCE. THEY  
MUST ALSO POST A MAINTENANCE BOND WITH THE CITY  
TO COVER THE COST SHOULD THE CITY NEED TO ASSUME  
MAINTENANCE.

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months - CATCH BASINS ; IN-LINE TREATMENT DEVICES
- Once every year - INSPECTED (FOR ALL STRUCTURES)
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

CLEANED AS NEEDED - DETENTION & RETENTION FACILITIES ; UNDERGROUND STORAGE

21. Is vegetation or weed overgrowth a maintenance problem?

Yes  No

If yes, what vegetation management efforts have been employed?

VEGETATION MUST BE MOWED MINIMUM OF 2/YEAR.

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes  No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes  No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

No  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes      No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

STORM WATER MANAGEMENT PLANS MUST BE REVIEWED  
AND APPROVED BY THE CITY PRIOR TO BMPs BEING CONSTRUCTED

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

NONE

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

CITY'S DEPARTMENT OF NEIGHBORHOOD SERVICES ACTIVELY  
ADDRESSES VECTOR PROBLEMS THROUGHOUT THE CITY.

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

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31. Other comments that you would like to make.

THE CITY HAS NOT EXPERIENCED REPORTED PROBLEMS  
OF VECTORS ASSOCIATED WITH STORMWATER MANAGEMENT  
STRUCTURES.

# Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey

(If extra space is required, please feel free to attach additional pages)

## I. Agency Information:

1. Name of Agency: MADISON DEPT. OF PUBLIC HEALTH
- Contact Person: DOUGLAS VOEGELI
- Address: 210 MLK JR. BLVD, RM 507
- City: MADISON State: WI Zip: 53709
- Email Address: dvoegeli@ci.madison.wi.us

2. What is the geographical area (square miles) covered by your agency?

- 1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

- Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 100 % Suburban \_\_\_\_\_ % Rural \_\_\_\_\_ %?

## II. Best Management Practice for Stormwater Retention and Treatment Structures

5. Has development in your district required the construction of stormwater control structures?

- Yes       No

6. Is your agency required to monitor discase or nuisance vector production of these structures?

- Yes       No

7. Which types of stormwater control structures is your agency familiar with?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. What percentage of these structures are along freeways or roadways?  
\_\_\_\_\_ %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

Wet Basins    Extended Detention Basins    Bioswales

Media Filters                      Oil Water Separators

Other (describe) \_\_\_\_\_

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?  
\_\_\_\_\_ months/years.

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes    No

15. Which types of structures are most associated with mosquito production?  
(refer to attached pamphlet.)

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16. Which mosquito species commonly utilize these structures?

*Culex* \_\_\_\_\_ *Anopheles* \_\_\_\_\_ *Aedes* \_\_\_\_\_ Others \_\_\_\_\_

17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches  
Rats                              Mice                              Squirrels

Other (please describe).

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18. List any factors that contribute to the suitability of these structures to produce vectors?

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**IV. Maintenance Concerns:**

19. Who is in charge of maintaining these structures?

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20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes            No

If yes, what vegetation management efforts have been employed?

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22. Is debris or silt accumulation at these structures a maintenance problem?

Yes            No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes            No, functioning as intended

If yes, please comment:

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24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

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**V. Comments**

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes   No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

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26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

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27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

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28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

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29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

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31. Other comments that you would like to make.

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received Feb 7, 2001

### Caltrans BMP Retrofit Pilot Study: Stormwater Runoff Survey (If extra space is required, please feel free to attach additional pages)

**I. Agency Information:**

WISCONSIN

1. Name of Agency: CITY OF MADISON-ENGINEERING DIV.

Contact Person: JEFF BENEDICT

Address: 210 MARTIN LUTHER KING JR. BLVD - RM 115

City: MADISON State: WI Zip: 53709

Email Address: JBENEDICT@CI.MADISON.WI.US

2. What is the geographical area (square miles) covered by your agency?

1-100       101-250       251-500       >1000

3. The geographical area covered by your agency is predominantly

Urban       Suburban       Rural

4. What percentage of the geographical area is

Urban 95 % Suburban \_\_\_\_\_ % Rural 5 %?

**II. Best Management Practice for Stormwater Retention and Treatment Structures**

5. Has development in your district required the construction of stormwater control structures?

Yes       No

6. Is your agency required to monitor disease or nuisance vector production of these structures?

Yes       No

7. Which types of stormwater control structures is your agency familiar with?

DETENTION BASINS, RETENTION PONDS, GRASS SWALES, OIL/WATER SEPARATORS, VORTEX STRUCTURES, MEDIA FILTERS

8. What percentage of these structures are along freeways or roadways?

30 %.

9. What purpose were these structures intended for?

- Storm/flood water control
- Groundwater recharge
- Stormwater pollutant removal
- Other

10. Is your agency familiar with Best Management Practices (BMPs) for removing pollutants from stormwater runoff?

Yes  No

11. Does your agency have BMPs in your district?

Yes  No

12. If yes, what types (refer to attached pamphlet)?

- Wet Basins
- Extended Detention Basins
- Bioswales
- Media Filters
- Oil Water Separators

Other (describe) VORTEX SEDIMENT SEPARATORS

**III. Vector Production Associated with the Stormwater Retention Structures.**

13. How long have these retention structures been in your area?

20 ~~months~~ years OR MORE

14. Are these structures associated with mosquito production or other types of vector or pest production?

Yes   No

- 15. Which types of structures are most associated with mosquito production? (refer to attached pamphlet.)

DETENTION BASINS  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- 16. Which mosquito species commonly utilize these structures?

Culex \_\_\_\_\_ Anopheles \_\_\_\_\_ Aedes X? Others \_\_\_\_\_

- 17. Are there other vectors associated with these structures?

Midges                      Sand Flies                      Black Flies      Roaches

Rats                              Mice                              Squirrels

Other (please describe).

WE DO HAVE SOME PROBLEMS WITH MUSKRATS BUT NOT DISEASE RELATED  
 \_\_\_\_\_  
 \_\_\_\_\_

- 18. List any factors that contribute to the suitability of these structures to produce vectors?

SAFETY BENCHES ON POND THAT FILL IN WITH CATTAILS MAY PRODUCE MOSQUITO BREEDING HABITAT  
 \_\_\_\_\_  
 \_\_\_\_\_

**IV. Maintenance Concerns:**

- 19. Who is in charge of maintaining these structures?

PUBLIC WORKS, HOWEVER, MANY BMP'S ARE PRIVATE & PRIVATELY MAINTAINED.  
 \_\_\_\_\_  
 \_\_\_\_\_

20. How often are these structures typically cleared of debris, vegetation or silt?

- Once every six months
- Once every year
- Once every two years
- Once every five years
- Once every ten years
- Never cleaned

21. Is vegetation or weed overgrowth a maintenance problem?

Yes      No

If yes, what vegetation management efforts have been employed?

MOWING  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

22. Is debris or silt accumulation at these structures a maintenance problem?

Yes      No

23. Are these structures retaining water longer than designed as a result of clogging or disrepair?

Yes       No, functioning as intended

If yes, please comment:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

24. Are there any non-weather related practices, i.e., irrigation, that increase standing water in these structures?

NON - STORM WATER DISCHARGE IS  
MINIMAL  
\_\_\_\_\_  
\_\_\_\_\_

V. Comments

25. Has or is your agency required to take an active role in the design, permitting or implementation of these structures?

Yes No

If yes, can you provide a reference list (i.e. management plan, registration or implementation manuals, etc):

WDNR - RMP HANDBOOK

26. What source reduction efforts does your agency take to limit the potential of these structures to harbor and produce vectors or pest problems?

HAS NOT BEEN A CONCERN

27. Describe the resources, if any, that your agency has dedicated to vector problems associated with BMPs:

NONE

28. Is there any written documentation, such as surveys, reports or publications, that may be available as background information on vector production in these BMPs?

No

29. What position would you take if more of these BMPs were to be built in your jurisdiction?

- a) Allow them to be built
- b) Recommend not to build them
- c) Be involved in the design process

30. If you chose the last box, in question #29 what are your recommendations to reduce the potential for vector production?

ENCOURAGE RETENTION PONDS OVER  
RETENTIAL BASINS  
\_\_\_\_\_  
\_\_\_\_\_

31. Other comments that you would like to make.

THERE ARE MANY NATURAL WETLANDS <sup>IN AND</sup> AROUND THE  
MADISON AREA ALONG WITH 5 AREA LAKES.  
THESE NATURAL FACILITIES PROBABLY CONTRIBUTE  
MORE TO ~~THE~~ MOSQUITO POPULATION THAN  
THE STORM WATER BMP'S.