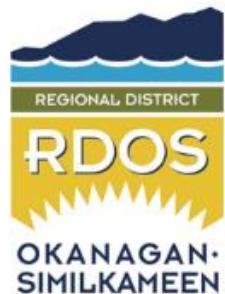


# Mosquito Control Program Year End Report 2018

## Regional District of Okanagan-Similkameen



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## Executive Summary

The Regional District of the Okanagan Similkameen (RDOS) commenced its Mosquito Control Program (MCP) in 1974. The program was designed to control nuisance mosquito populations throughout the Similkameen and South Okanagan. All site services are upon request of individual property owners, exclusively. They are eligible to receive treatment for standing water bodies too large for them to drain. To date, the RDOS continues to adapt and incorporate new tools in order to stay relevant and effective.

As predicted in last year's report, 2018 was the mosquito programs most demanding season with record flooding in both the Okanagan and the Similkameen Valley. Flooding reports from multiple areas in the RDOS began on March 22, and by April 17, a State of Local Emergency was declared for Oliver, followed closely by a State of Local Emergency on May 6, for the entire South Okanagan including the Similkameen. In most areas, floodwaters from these events did not recede until late June with the exception of properties adjacent to the Okanagan River Channel; this floodwater remained until a 2.5 foot river drop on July 20, followed by another 1 foot drop by July 24. By August 7, properties on Rd 9 no longer had floodwaters, although, Rd 6 continues to have floodwater mid-August. As a result of the vast land coverage of flood waters this year, above normal amounts of flood water mosquitos (Aedes) hatched early in the season, followed by the appearance of our summer mosquitoes (Culex, Culiseta and Anopheles). These insects thrived in the consistent supply of standing water throughout the remainder of the season. Unfortunately, many areas will not see their flood waters disappear before freeze up, thus mosquitoes will continue to be somewhat of a nuisance until the first frost. High ground water levels and a robust fire season will unfortunately set the stage for higher than normal flood events next year with the accompanying high mosquito populations.

**Figure 1. Flood** Erratic weather patterns caused existing sites to reach full flood levels earlier than ever before. Excessive flood- waters added over 30 new sites to the program, many of which remained full for the duration of the season. The increase in flooded areas, combined with very high water levels at original sites, made for a busy season in which the crew had to be extremely careful as to when and where they allocated their resources.



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**Acknowledgements:** The program would like to acknowledge the contributions from RDOS administration staff, front counter staff and the dedicated flight staff at Eclipse Helicopters for assisting in the successful execution of the program every year. *Zoe Kirk, Supervisor MCP*

# 1. Introduction

## 1.1 Program Purpose and Scope

From March to September each year the RDOS Mosquito Control Program (MCP) treats over 400 sites throughout electoral areas: A, B, C, D, F, G, & H as well as Summerland, Osoyoos, Penticton, and Oliver. The Regional District's MCP methodologies can be put into three main categories: prevention, treatment, and monitoring. Prevention focuses on minimizing larval habitats; whereas, treatment requires pesticide in order to control mosquito populations. Monitoring is constant and requires vigilance from the crews. Mosquitos being controlled throughout the district can be placed into two categories: nuisance and vector. In the South Okanagan and Similkameen, the vast majority of mosquitos are considered to be nuisance mosquitoes. Nuisance mosquitoes are extremely aggressive towards humans and livestock but at this point are not known to carry life-threatening pathogens. Vector mosquitoes, on the other hand, are known to transmit a variety of diseases that can infect humans and animals causing discomfort, or in more serious situations, death. Most seasons in the RDOS involve targeting nuisance mosquitos; however, outbreaks have happened (i.e. 2009-2010 West Nile outbreak) reiterating the importance of having a robust mosquito control program and procedures in place to deal with situations as they arise with continued focus on assuring the health and safety of the local residences.

## 1.2 Program History

Nuisance mosquitos have been a problem in the South Okanagan and Similkameen Valley for as long as humans have inhabited them. The main reason for this is the quantity and quality of mosquito larval habitats. From oxbows to wetlands, this area of BC has it all. In 1974, the Regional District of the Okanagan Similkameen initiated a program that would monitor and mitigate local mosquito populations. Over the past forty years, the program has been adapting and integrating modern tools and technology to remain as effective as possible.

Figure 2. Larvae dips



## 2. Treatment Information & Resource Allocation

### 2.1 Application Methods

Canada is *bacillus thuringiensis var israelensis*, more commonly referred to as Bti. Bti is a naturally occurring, non-toxic bacteria which specifically targets mosquito and black fly larva. For further information about Bti and how it works, refer to the Health Canada-Bti

**Link to Health Canada BTi** <https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/bacillus-thuringiensis-subspecies-israelensis.html>

### 2.2 Treatment data (2018)

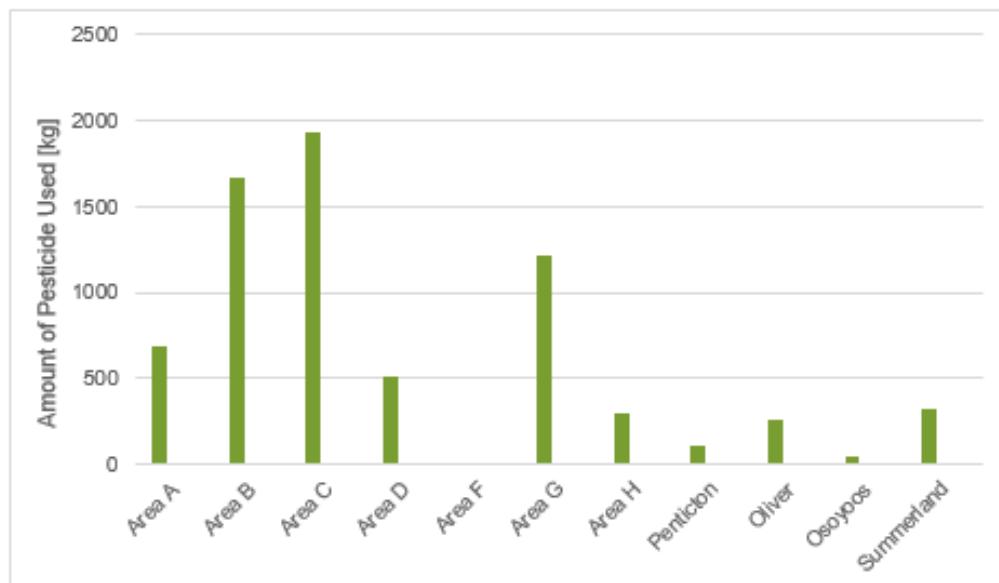
On a normal year in the past, the program used between three and four helicopter flights. This year (and last), due to the large amount of flooding and an abundance of new sites, a total of five helicopter flights were required in order to keep mosquito populations in check.

Water levels at nearly all site locations reached unseen levels; however, Area's: A, B, C, and some parts of Area G were the most effected by the flooding.

The following tables and charts provide a complete record of the 2018 Mosquito Control Programs treatment application records.

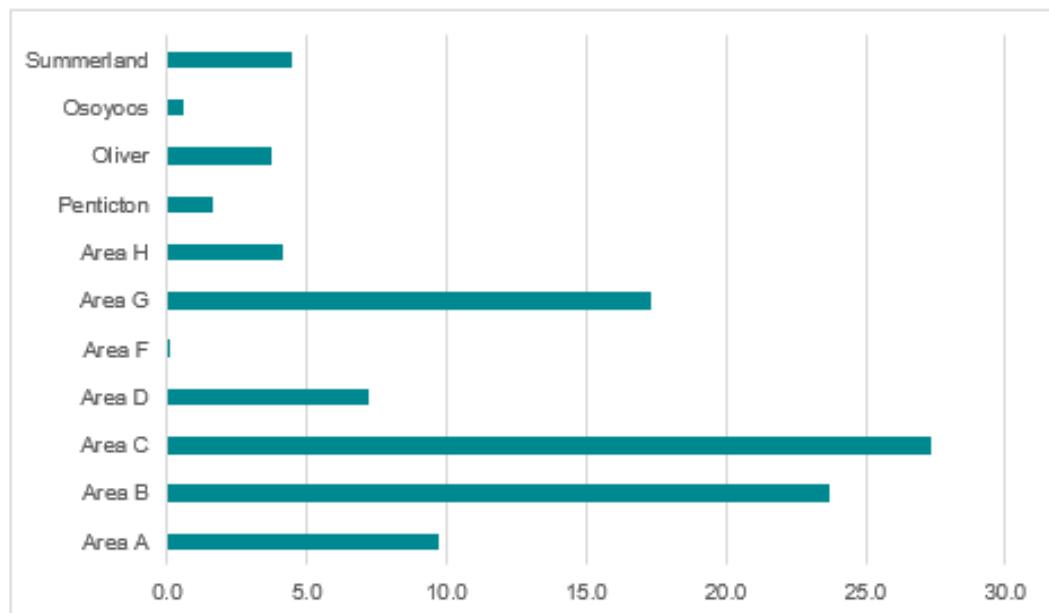
**Table 2 Total Amount of Pesticide Used**

Table 2.0: Total Amount of Pesticide Used



**Table 2.1 Percentage of Total Pesticide Used**

Table 2.1: Percentage of Total Pesticide Used



**Table 2.2 Helicopter Treatment Data (assumes 10kg/ha)**

Table 2.2: Helicopter Treatment Data (assuming 10kg/ha)

Area / Municipality	Larvicide Amount [kg]	Treated Area [ha]
Area 'A'	561	56
Area 'B'	1190	119
Area 'C'	1370	137
Area 'D'	235	24
Area 'G'	941	94
Oliver	150	15
<b>TOTALS:</b>	<b>4451 kg</b>	<b>445 ha</b>

**Table 2.3 Backpack and Hand Treatment Data (assuming rates vary 3-10 kg/ha)**

Table 2.3: Backpack & Hand Treatment Data (application rates vary between 3-10 kg/ha)

Area / Municipality	Larvicide Amount [kg] backpack/hand	Treated Area [ha] backpack/hand
Area 'A'	125	22.7
Area 'B'	481	87.4
Area 'C'	559	101.7
Area 'D'	273	49.6
Area 'E'	0	0
Area 'F' West Bench	5.8	1.06
Area 'G'	279	50.8
Area 'H'	291	52.9
Oliver	112	20.3
Osoyoos	42	7.56
Penticton	113	20.6
PIB	0	0
Summerland	316	57.6
<b>TOTALS:</b>	<b>2597 kg</b>	<b>472 ha</b>

**Table 2.4. Time Spent by Percentage in Each Area or Municipality**

Percentage of time spent in each Area or Municipality				
Area	Heli	BackPack	Total	% time
A	56	22.7	78.7	9
B	119	87.4	206.4	23
C	137	101.7	238.7	26
D	24	49.6	73.6	8
E	0	0	0	0
F	0	1.06	1.06	0.5
G	94	50.8	144.8	16
H	0	52.9	52.9	6
Oliver	15	20.3	35.3	4
Osoyoos	0	7.56	7.56	1
Penticton	0	20.6	20.6	0.5
Summerland	0	57.6	57.6	6
				917.22
				100

### 3. Public Information

#### 3. 1 Preventative Measures

Removal and control of standing water should be the main goal of property owners to control mosquito breeding sites. A 250 ml dip of water containing one mosquito larva can translate to in accesses of 10,000 mosquitoes emanating from a small backyard pond or swimming pool. Unused tires, lawn depressions, gutters, animal feeders, birdbaths, all assortment of man-made containers, leaking irrigation and rain events can all be sources of water ready to be harbingers of larvae. Decorative ponds should be aerated with a fountain, and all screens on open windows and doorways in good repair are a few of the pointers provided to property owners.

#### 3.2 Mosquito Biology

In order to reproduce, all mosquitoes need water in their larval stage. No water, no larvae. These larvae must proceed through four stages called instars. Each stage requires a molt allowing the larvae to mature and increase in size. The final water stage is called a pupae during which a complete metamorphosis takes place and the winged form emerges. This entire process can begin in a snow meltwater pool and take a few weeks; add heat though, and this process can complete in as little as 5-7 days. With normal temperatures most mosquitoes require 7-14 days. Adult mosquitoes feed on nectar; in addition, the female requires a blood meal in order to complete the development of her eggs. Females will take blood as soon as the opportunity presents itself; if no blood is available, she will go looking for it. Although most mosquitoes do not have to fly far to find a blood source, some species can fly great distances (up to 20 km) and up to great heights. Wind is also a great disperser of mosquitoes placing increasing importance on new larval sites.

**Figure 3 Understanding Mosquitos**

There are over 50+ species of mosquitoes reproducing within the boundaries of the RDOS. For ease of understanding the RDOS place our mosquitoes in one of 2 groups: Floodwater mosquitoes and Summer Mosquitoes.

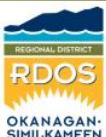


Floodwater mosquitoes lay their eggs in the soil of receding flood water where they overwinter in egg form waiting for the spring floods. These eggs can remain viable for upwards of 20 years and can endure deep cold. When the floods come, the eggs hatch synchronously, causing an intense bio-mass of flying insects not even the most industrious of predators can hope to control. Large areas of flooded land increases the number of eggs ready to hatch in subsequent flooding events.

Summer Mosquitoes lay their eggs on the water surface. The hotter the temperatures the quicker the eggs hatch. These mosquitoes continue to lay eggs as long as there is water available and the temperatures stay above freezing. The last of the hatched females overwinter breed and are ready to take a blood meal first thing in the spring as soon as temperatures allow.

**Figure 4 Mosquito Program Brochure**

## Mosquito Control



**RDOS Mosquito Control Program**

The RDOS mosquito control program responds to property owners who contact the RDOS when they cannot effectively drain standing water from their own property.

**Areas of control are:**

- Electoral Area "A"
- Electoral Area "B"
- Electoral Area "B"
- Electoral Area "C"
- Electoral Area "D"
- Electoral Area "F"
- Electoral Area "G"
- Electoral Area "H"
- City of Penticton
- Town of Osoyoos
- Town of Oliver
- District of Summerland



Without access, we cannot treat!

For more information on the Mosquito Control Program or mosquitos in BC visit:

<https://www.rdos.bc.ca/departments/public-works/pest-control/mosquito-control/>  
and  
<http://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management/business-industry/sector-specific-tools-guides/mosquitoes>



For more information contact:  
**Regional District of Okanagan-Similkameen**  
**101 Martin Street**  
**Penticton, BC**  
**T: 250.492.0237**  
**TF (BC/Alta): 1.877.610.3737**  
**E: info@rdos.bc.ca**

Find us on   

**RDOS**  
**Public Works Department**

## Mosquito Control Program





## 4. Common Questions and Answers

### **Q: How does the RDOS control mosquitos?**

A: With the use of environmentally friendly pesticide. The RDOS uses a granular product called Vectobac®. Small pieces of crushed corn are impregnated with an active ingredient called Bacillus thuringiensis var israelensis (Bti). The BTI is ‘stuck’ to granules using paraffin wax. The product is placed on the water surface where the active ingredient is released. Mosquito larvae are filter feeders and when they ingest the bacteria it creates a toxin in their gut which terminates them.

### **Q: Can Bti have negative effects on humans and other animals?**

A: Bti is a non-toxic naturally occurring bacteria which has been successfully used as a biological pest control agent to combat mosquitoes and black flies since 1982. There has been a lot of research done on the product during its many years of use worldwide. As a listed pesticide, research shows its efficacy on these 2 targeted organisms (mosquito and black fly larva). There have been no registered poisonings of humans due to an intake of Bti.

### **Q: Do I have to pay for mosquito control?**

A: Mosquito control is paid for by the entire service area in which you reside. Therefore, all residents in the area are part of the program even if control is not on their property.

### **Q: Does the RDOS treat everywhere there is mosquito populations?**

A: No. Private property owners must ask for mosquito control to be conducted on their property. Crews only treat where permission has been granted. Also, most conservancies do not allow any form of mosquito control. The program does not treat moving water or close to Lakes or rivers.

### **Q: Can I get sick from a mosquito bite?**

A: Mosquitoes are vectors for disease. The biggest killers in tropical countries are Malaria and Yellow Fever. Here in BC, mosquito bites can result in extreme allergic reactions and/or secondary infections. Diseases like Canine Heart-Worm, Western Equine Encephalitis and West Nile Virus are transmitted between birds and mosquitoes to family pets, livestock and humans. Recently, the mosquito-vectored virus that causes Zika has become a major health concern in many areas of the world including the southern USA. We here in Canada are monitoring the situation. The primary vector for Zika, Aedes aegypti, does not find our current climate hospitable, but due to our changing climate and the possibility of competent secondary mosquito vectors, Canada has employed two level 3 labs that are currently studying and monitoring the situation.

## 5. RDOS Integrated Pest Management Plan

Link to IPMP <http://www.rdos.bc.ca/departments/public-works/pest-control/>

The RDOS is required to have an active, approved Integrated Pest Management Plan in place at all times. The plan expires every five years, and reapplication is required. Costs are adjusted in correlation to amount of hectares to be treated; from data supplied the Province each year after treatment season ends.

Full public consultation is required, including all Indigenous peoples who have rights or claims on any areas that are currently or may be treated.

Figure 5 – Integrated Pest Management Plan



## 6. Bylaw No. 1149 – Originating Service Establishment Bylaw

### 6.1 Service Establishment Bylaw

REGIONAL DISTRICT OF OKANAGAN-SIMILKAMEEN

BYLAW NO. 1149

A bylaw to establish a mosquito control service pursuant to the provisions of Section 789 (1) (b) of the Municipal Act.

WHEREAS, by Supplementary Letters Patent dated June 18, 1974, the Regional District of Okanagan-Similkameen was empowered to provide mosquito control services to Electoral Areas A, B, C, D, E, and F;

AND WHEREAS the Regional Board is desirous of proceeding under Section 767 of the Municipal Act, by bylaw under Section 767 (4) and 794 of the Municipal Act, to establish the service of mosquito control as an extended service.

AND WHEREAS the Regional Board has obtained the consent of at least two-thirds of the participants as required under Section 802 (1) (b) of the Municipal Act;

NOW THEREFORE the Regional Board of the Regional District of Okanagan-Similkameen in open meeting assembled, ENACTS as follows:

1. The Extended Service being established is Mosquito Control.
2. The Extended Service Area is contained within the boundaries of:

the City of Penticton  
the District of Summerland  
the Town of Osoyoos  
the Village of Oliver  
the Village of Keremeos; and  
  
the Electoral Areas of 'A', 'C', 'D', 'F', and 'G'.
3. The participating areas for this Extended Service are:

the City of Penticton  
the District of Summerland  
the Town of Osoyoos  
the Village of Oliver  
the Village of Keremeos; and  
  
the Electoral Areas of 'A', 'C', 'D', 'F', and 'G'.

4. The annual operating costs for the Service within the municipal participating areas shall be recovered by the requisition of money under Section 809 of the Municipal Act, to be collected by a property value tax, in the Extended Service Area, to be levied and collected under Section 810.
  5. The annual operating costs for the Service within the electoral participating areas shall be recovered by the requisition of money under Section 809.1 of the Municipal Act, to be collected by a property value tax, in the Extended Service Area, to be levied and collected on improvements only under Sections 810.1 (1) and 806 (1) (b).
  6. The tax requisition shall be apportioned among the participating areas as follows:

theCityofPenticton	22%
theDistrictofSummerland	4%
theTownofOsoyoos	3%
theVillageofOliver	4%
theVillageofKeremeos	11%
ElectoralArea'A'	7%
ElectoralArea'C'	18%
ElectoralArea'D'	13%
ElectoralArea'F'	9%
ElectoralArea'G'	9%

7. This bylaw may be cited as the "Regional District of Okanagan-Similkameen Mosquito Control Extended Service Establishment Bylaw No. 1149, 1990".

CONSENTED TO by at least two-thirds of the participating members.

READaFIRSTTIMEthis dayof , 1990.  
READaSECONDTIMEthis dayof , 1990.  
READaTHIRDTIMEthis dayof , 1990.

Certified a true and correct copy of Bylaw No. 1149 at third reading.

Administrator/Secretary-Treasurer

APPROVEDBYTHEINSPECTOROFMUNICIPALITIESthis dayof  
, 1990.

RECONSIDERED, PASSED AND FINALLY ADOPTED this \_\_\_\_\_ day of \_\_\_\_\_  
, 1990.

Chairmain Treasurer Administrator/Secretary-

FILED WITH THE INSPECTOR OF MUNICIPALITIES this \_\_\_\_\_ day of \_\_\_\_\_

## 6.2 Bylaw No. 2285 – update

### REGIONAL DISTRICT OF OKANAGAN-SIMILKAMEEN

### BYLAW NO. 2285, 2004

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#### A bylaw to establish a service for the control of mosquitoes.

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WHEREAS the *Local Government Act* authorizes the Regional District of Okanagan-Similkameen to operate any service that the Board of the Regional District considers desirable or necessary for all or part of the Regional District.

AND WHEREAS the Board of the Regional District of Okanagan-Similkameen considers it desirable and necessary to operate a mosquito control service in Electoral Area "A" of the Regional District;

AND WHEREAS approval of the electors in the participating electoral area for the service established by this bylaw has been given by alternative approval process in accordance with subsection 797.5(1)(b) of the *Local Government Act*;

NOW THEREFORE, the Board of the Regional District of Okanagan-Similkameen, in open meeting assembled, enacts as follows:

#### Citation

1. This bylaw shall be cited as the "Electoral Area "A" Mosquito Control Service Establishment Bylaw No. 2285, 2004".

#### Establishment of Service

2. The Regional District hereby establishes a service for the detection, prevention, and control of mosquitoes, such service to be known as the "Electoral Area "A" Mosquito Control Service".

#### Description of the Service

3. The Mosquito Control Service shall provide for the detection, prevention, and control of mosquitoes and, for that purpose, the Board of the Regional District of Okanagan-Similkameen is empowered and authorized to do all things necessary, including, without limiting the generality of the foregoing, obtaining required permits and licenses, employing staff, purchasing mosquito control agents and equipment, and entering into contracts, for the purposes of the Mosquito Control Service.

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