PEST MANAGEMENT PLAN

May 18th, 2013

RDOS-MOS-PMP-2013/2018

Nuisance Mosquito Control Plan

Regional District Okanagan-Similkameen
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1.0 Introduction

The overall objective of the Regional District of the Okanagan-Similkameen (RDOS) nuisance mosquito control program is to ensure public health and safety through appropriate levels of mosquito control that will meet with maximum tolerance of biting insect populations. The RDOS has conducted a nuisance mosquito control program for over twenty-three years. Under the West Nile Virus Prevention Initiative, the RDOS also conducted vector control initiatives. This Pest Management Plan (PMP) will allow the RDOS to conduct both nuisance and vector control depending on funding and the objectives decided annually throughout the duration of the PMP. The program is based on the principals of Integrated Pest Management (IPM) in that the most environmentally sensitive methods of control are considered first. The RDOS intends to include the following activities in its program: mosquito larval habitat reduction and manipulation (where appropriate), public education, and mosquito larval control using species-specific larvicides applied by hand, back-pack applicator and helicopter. **Adulticiding will not be conducted in the RDOS under this PMP**.

In areas adjacent to extensive larval development habitat, mosquito populations can become extremely high. When this happens, quality of life for residents in the area can decrease because of severely limited outdoor activity. In some instances human and animal health can be impacted as some mosquito species are capable of transmitting illnesses such as Western Equine Encephalitis, Canine Heartworm and West Nile virus. Further, nuisance mosquitoes can have potential economic impacts with reduced tourism, losses in the cattle industry (cattle growth is reduced as mosquitoes cause annoyance and interfere with cattle feeding), and reduced property values.

Prevention and reduction of mosquito larval development sites is the first objective of the RDOS program, as preventing a problem is always better than trying to control the problem once it occurs. However, in reality, there are few instances in which habitat prevention is possible and therefore the vast majority of the RDOS mosquito control campaign is focused on controlling mosquitoes while they are in their larval stages, (as opposed to their adult stage) for two primary reasons. Firstly, larval control is much more efficient than adulticiding – it is possible to treat very high numbers of larval mosquitoes when they are contained in their water habitats, while adult mosquitoes tend

to disperse soon after emerging over a much wider area. Secondly, larvicides such as Aquabac, Vectobac, Altosid and VectoLex are species-specific, affecting only aquatic members of the Order Diptera, which includes mosquitoes, black flies and midges, and do not impact non-pest and beneficial insects such as pollinators and predators.

The BC *Integrated Pest Management Act* and the *Integrated Pest Management Regulation* require pesticides to be applied pursuant to the principles of IPM. This in turn requires the development of a Pest Management Plan (PMP) (this document) and the use of pesticides in accordance with the terms and conditions of the *Integrated Pest Management Regulation* and the commitments made in this PMP.

1.1 Geographic Boundaries of this Pest Management Plan

The RDOS covers a land base of 10,400 km^2 and includes six municipalities, four First Nations groups (Upper and Lower Similkameen Indian Bands, Osoyoos Indian Band and Penticton Indian Band), and eight Electoral Areas. This PMP covers the City of Penticton, the District of Summerland, and the Towns of Osoyoos, Oliver, and Princeton. It does not cover the Village of Keremeos. The Electoral Areas A, B, C, D, F, G and H are also included in this PMP. Electoral Area E is not included. Within the participating municipalities and Electoral Areas, private, public and crown lands are all included. **However, no mosquito control (habitat modifications or larviciding) will be conducted without the permission of the applicable owner, agency or authority.** A map of the geographic boundaries to which this PMP applies can be found in Appendix A. Detailed maps displaying the locations of individual larval development sites can be viewed at the Regional District Okanagan-Similkameen office located at 101 Martin Street, Penticton, B.C., V2A 5J9.

1.2 Responsibility for the Integrated Mosquito Control Program

The person responsible for managing pests within the RDOS and therefore the primary contact for information relating to this Pest Management Plan is Doug French, Manager of Public Works. Mr. French can be contacted at (250) 490-4103.

1.3 Time period of this PMP

This PMP shall be in force for a five-year period from the date that a Pesticide Use Notice (PUN) has been submitted to the BC Ministry of Environment, and

confirmation of the plan has been received. It is anticipated that this project will run from May 18th, 2013 through May 18th, 2018.

1.4 Outline of this PMP

The content of PMP's prepared in the province of British Columbia is legislated under the *Integrated Pest Management Regulation* (Section 58) and the checklist provided in the *Regulation* is included in Appendix B. This PMP will describe the RDOS nuisance mosquito control Integrated Pest Management program including monitoring activities, treatment decisions, treatment options, and treatment evaluations. It will also outline the operational procedures conducted by the RDOS to ensure safe methods of transporting, storing, handling, and applying the pesticides used in this program. This PMP will address the RDOS's policies for disposing of empty pesticide containers and unused pesticide, as well as for responding to pesticide spills. There will be a discussion of the RDOS's strategies for the protection of community watersheds, domestic and agricultural water sources, fish, wildlife, riparian areas, and food intended for human consumption. Finally, this PMP will outline the commitments of the RDOS with respect to maintaining pesticide records and submitting annual reports and notices.

2.0 Integrated Pest Management

A requirement of all PMP's in British Columbia is an explanation of how the applicant (in this case, the RDOS) will utilize the elements of Integrated Pest Management (IPM). The six elements of an IPM strategy that will be discussed in detail in the following Sections are:

1) **a strategy to *prevent* organisms from becoming pests (Planning);**
2) **a method to *identify* pests;**
3) **a *monitoring* (surveillance) program;**
4) **a description of the *injury thresholds* used to make treatment decisions;**
5) ***treatment options* and selection criteria; and**
6) **a method for *evaluating effectiveness* of pesticide use.**

2.1 Prevention (Planning)

Prevention is one of the most important options for successful mosquito control. The RDOS actively pursues the following preventative measures in its mosquito control program:

1. Reduction and/or modification of mosquito larval development sites and,

2. Public education

2.1.1 Source Reduction/Modification

The RDOS actively encourages the reduction of mosquito larval development sites and water management as effective methods of mosquito control. Without standing water there are no mosquitoes, as mosquitoes are unable to complete their life cycle without water.

Source reduction is simply the use of physical methods to eliminate standing water by draining or filling in mosquito larval development sites. The RDOS is committed to conservation and any naturally occurring mosquito larval development sites that are also important habitat for other biota will be left unaltered. However, larval development sites such as poorly draining roadway ditches and depressions in irrigated farmland and orchards may be filled in or drained by the RDOS after appropriate consultation with property landowners, habitat protection officers and/or other interested groups has been completed.

If draining or filling is not an option, many mosquito larval breeding sites such as storm water retention ponds, sewage treatment ponds, farm dugouts, ornamental ponds, and bird baths can be made unsuitable for mosquito larval development through a combination of good design (*e.g.*, steeply sloped and graveled shorelines), water level manipulation, and control of emergent vegetation. In some cases, the RDOS may recommend that semi-permanent ponds that support non-target species intermittently may be excavated or have their edges sloped or cleared of thick vegetation by the land owner (special care and consideration will be made when these are naturally occurring habitats to ensure protection of non-target biota). Bodies of water with sloped, graveled, rocky or sandy shorelines generally will support few mosquitoes, as larvae will be exposed to wave action and predators and will have difficulty obtaining food. In addition, scraping of sediment from the bottom of roadside ditches every few years can make the ditches unattractive for mosquito breeding by enhancing proper drainage. Ditches that are slow to drain may form a series of pocket pools and support lush grasses and weeds, thereby becoming prime larval breeding sites.

The RDOS will encourage landowners to participate in habitat management. Ornamental ponds can be stocked with goldfish and/or water agitators such as fountains can be installed. Screens can be placed over rain barrels to prevent females from reaching the water surface to lay eggs (as well as the emergence of larvae already present in the barrels), and compost piles can be turned frequently to prevent the pooling of water on this nutrient rich environment. Larval development sites such as children's wading pools and bird baths should be drained and the water replaced at least once per week, so that any larvae present will be killed by desiccation.

In some agricultural areas, over-irrigation or flood-irrigation can produce significant larval development habitat. Proper watering of fields at ranching and hay farming operations will be encouraged by the RDOS through education. Efforts will be made to contact farmers when over-irrigation, flood-irrigation or broken irrigation pipes are noticed. Farmers will be encouraged to alter their practice and/or repair broken irrigation pipes.

2.1.2 Public Education

Since 2004, the RDOS has engaged in public education initiatives such as radio advertising and television advertising with grant funding from the Ministry of Health Services West Nile Virus Prevention Initiative. The message of these programs has been to reduce standing water around the home (*e.g.* clear eaves troughs of debris so they can drain properly, empty water holding containers, keep water from pooling on swimming pool covers, *etc.*); to practice personal protective measures (wear DEET and long-sleeved shirts and pants); and to learn to recognize mosquito larvae (many people think they are "worms", "tadpoles" or "little fish"). These media-related public education initiatives may continue in the future, although at present, the Ministry of Health Services funding is unavailable making funding for these types of initiatives minimal.

The RDOS website includes information describing the mosquito control program, and can be accessed at the following URL:

http://www.rdos.bc.ca/departments/public-works/pest-control/mosquito-control/

2.2 Identification of the Pest

Mosquito surveillance allows controllers to identify when and where mosquito pests occur. The RDOS has engaged in ongoing larval surveillance and adult

surveillance. At least thirty-three different species of mosquitoes have been captured in adult light traps and as larvae in the Regional District. All of the following species present in the RDOS except *Culex territans* (feeds on amphibians) and *Culex pipiens* (feeds on birds) can be considered nuisance species (although *Culex pipiens* is an excellent vector of mosquito-borne illness among birds). Vector species will be defined by the Ministry of Health Services. The following species have been identified in the RDOS:

1. *Anopheles earlei*
2. *Anopheles freeborni*
3. *Anopheles punctipennis*
4. *Aedes cinereus*
5. *Aedes vexans*
6. *Coquillettidia perturbans*
7. *Culex pipiens*
8. *Culex tarsalis*
9. *Culex territans*
10. *Culiseta impatiens*
11. *Culiseta incidens*
12. *Culiseta inornata*
13. *Culiseta minnesotae*
14. *Culiseta morsitans*
15. *Ochlerotatus canadensis*
16. *Ochlerotatus communis*
17. *Ochlerotatus dorsalis*
18. *Ochlerotatus euedes*
19. *Ochlerotatus excrucians*
20. *Ochlerotatus fitchii*
21. *Ochlerotatus flavescens*
22. *Ochlerotatus implicatus*
23. *Ochlerotatus increpitus*
24. *Ochlerotatus intrudens*
25. *Ochlerotatus melanimon*
26. *Ochlerotatus mercurator*
27. *Ochlerotatus provocans*
28. *Ochlerotatus pullatus*
29. *Ochlerotatus punctor*
30. *Ochlerotatus sierrensis*
31. *Ochlerotatus spencerii var idahoensis*
32. *Ochlerotatus spencerii var spencerii*
33. *Ochlerotatus sticticus*

In the field, mosquito larvae and adults can be difficult to identify to the species level. For positive identification, mosquitoes need to be examined under a microscope. In the RDOS, the determination as to whether a larva is likely to be a pest or vector species or not, will be based on the habitat where the larvae are found and the time of year. Mosquitoes are selective with their habitats. Different species of mosquitoes tend to choose different types of habitats. The time of year can also give clues to the identity of the mosquito species.

Generally, the mosquito larvae that appear in early spring (sometimes even before ice-off) are of the genera *Aedes* and/or *Ochlerotatus*. *Aëdes* is the Greek word for

disagreeable, and is an accurate reflection of these species in terms of both numbers and ferocity. *Aedes* and *Ochlerotatus* species lay their eggs at the edges of water bodies. Snowmelt species rely on warm temperatures and/or low oxygen levels in water to induce their eggs to hatch. Larvae of the floodwater species appear as soon as their eggs are wetted (following snowmelt and then river flooding). Large areas of habitat often become active at once with rising floodwaters along creeks and rivers and in permanent marshes as the snow melts and raises the water level in the marshes. Therefore, huge batches of mosquitoes hatch at the same time. This is due primarily to the fact that eggs laid by most species remain viable for a number of years, and therefore egg concentrations in the soil can become very dense. Whenever habitat along flooding creeks and rivers and in permanent marshes in the spring contains mosquito larvae, it is assumed that these are pest species and treatment of the larvae will be considered.

As the spring progresses, the occurrence of floodwater larvae tends to decrease (unless a large storm event causes flooding, or in the case of agriculture, a farmer over-irrigates, flood-irrigates or fails to repair broken pipes). Water left standing after the spring floods will begin to colonize with species of mosquitoes from the *Anopheles, Culiseta* and *Culex* genera. *Anopheles* mosquitoes are easily recognized in the field as the larvae are much different in appearance from all other larvae in British Columbia. They lay flat on the surface of the water and lack a siphon. All *Anopheles* species in British Columbia can be considered pests and therefore whenever these species are seen, treatment will be considered. *Culiseta* and *Culex* mosquitoes lay their eggs on the surface of standing water and will produce multiple generations over the summer. Some species from each of these genera can be nuisance mosquitoes. The only exception will be in catch basins. It is well-known that catch basins rarely contain any species other than *Culex pipiens.* Since this species is not a pest of humans, catch basins may not be treated under the nuisance control program and will be treated only if vector control is needed in the RDOS in any given year. In general, catch basin control will be conducted under the direction of the Minister of Health Services.

2.3 Monitoring (Surveillance) Program

The RDOS conducts three kinds of surveillance as part of their nuisance mosquito control program: they monitor 1) environmental conditions; 2) larval development sites and larval populations; and 3) mosquito predator populations.

2.3.1 Environmental Monitoring

As the first stage of environmental monitoring, the RDOS monitors river levels, snow pack levels and precipitation. Monitoring of each of these variables allows mosquito control staff to estimate the size and number of larval development sites that will appear throughout the season. If a site contains stagnant water *and* the water table or runoff is rising (or expected to rise), the site will be visited weekly to check for new larvae (as new eggs may be wetted and hatching). If a site is dry, and the water table is dropping and there has been no rainfall, the site will be re-visited within 2-3 weeks.

Also, current weather conditions are monitored as these can affect whether or not treatments are carried out on any given day. Hand treatments of granular larvicides are occasionally deferred during high precipitation events or during wind storms. When helicopter applications are planned, wind and precipitation monitoring is especially important as helicopter treatments are halted when wind conditions make it difficult for the pilot to aim granular larvicides at the larval development sites (*i.e.* the pilot is unable to compensate for drift of the granular product due to wind). Also, helicopter campaigns are not possible during precipitation events as the granular larvicides become wet, thus clogging the application equipment. This can result in improper application rates and possible damage to the application equipment.

2.3.2 Surveillance of Larval Development Sites and Mosquito Larvae

An ongoing activity in the nuisance mosquito program is that of searching for and cataloguing mosquito larval development sites. Sites have been identified through ground searches, digital image searches and reports from citizens of the Regional District. The RDOS has developed an electronic database that enables staff to access larval development site data quickly and accurately. This database is continuously updated and supplements the written data that is collected in the field. The database includes information as to the owner of the land (private or public), history of treatments, and comments concerning the type of larval development site (permanent marsh, transient floodwater site, etc). Information such as "no treatment" areas is also included. Examples of "no treatment" or "avoid" areas include those that: the landowner has refused permission; are in environmentally sensitive areas such as wildlife sanctuaries; or are in fish-bearing habitats. This database is updated throughout the season with treatment information and newly located larval development sites.

Once larval development sites have been located, they are included in a schedule for larval surveillance. Depending on the type of habitat (snowmelt, semi-permanent, irrigation overflow, river runoff), predictions are made as to when they are likely to become active with larvae. The sites are then visited (as per the schedule outlined in Section 2.3.1) and an assessment as to the number and life stage (instar) of the larvae is made. Dippers are used to collect water from the larval development site and the number and life stage of the larvae is determined. Depending on the size of the larval development site a number of "dips" may be taken to determine the mosquito population throughout the site. Information as to the average larval density and life stage of the larvae is recorded prior to treatment so that a comparison can be made post-treatment when crews return on another day to the treated sites to assess the effectiveness of the larviciding application.

If the larvae are at an appropriate life stage and in sufficient numbers to meet a threshold level (Section 2.4), larviciding activity will be considered. First, the size and characteristics of the site will be examined in order to estimate the amount of larvicide needed (application rates vary depending on the depth of the site and the amount of organic material present). Next, no-treatment areas will be considered, and if they cannot

be avoided, plans for treatment will stop. Next, predator populations will be considered to determine if they are sufficient to control the larvae without larviciding. Finally, if possible, the genus of the mosquito will be recorded, however as mentioned earlier, this is rarely possible in the field.

2.3.3 Surveillance of Predator Populations

Predator populations will be monitored during visits to larval development sites. A visual search for aquatic predators will be conducted and qualitative data (*e.g.* none, few, many, etc) will be kept as to predator presence and abundance. In addition, staff will observe the area for the presence of bats, swallows, and insect predators such as dragonflies. When predator presence is high and larval and adult mosquitoes are at a tolerable level, a technician may determine that larviciding activities may not be necessary. This decision is to be made at the sole discretion of the certified applicator.

2.4 Injury Thresholds

Injury thresholds are pre-set numbers that are used by staff to determine whether pest populations meet high enough level for treatment. The treatment threshold for mosquito larvae is determined by the certified applicator and takes into account a number of variables. The applicator makes a decision as to whether the numbers of larvae present are likely to cause a nuisance if allowed to develop to adults.

As a general guideline, the treatment threshold for mosquito larvae is an average of **three larvae per 300ml dip**. This threshold was selected as it the standard that has been used in British Columbia and other areas of Canada and the United States. However, the RDOS will consider exceptions to this rule. In some cases, an applicator may decide that an average of three larvae per dip may not be sufficient numbers for treatment. For example, if the larval development site is very small and a good distance from the public, the applicator may decide that allowing the larvae to develop will not pose a nuisance problem and therefore no treatment would be necessary. Or perhaps the technician will determine that the site is likely to dry-up prior to the larva emerging. Conversely, a technician may encounter a site that is very large and deep with larvae distributed throughout the water column. In this case, it may be difficult to capture three larvae in a dip, however the cumulative number of larvae in the site can be astounding and treatment could be warranted. Certified applicators working for the RDOS will make

the final decision as to whether or not to carry out larval treatment. No larviciding will be conducted on private property without the consent of the landowner.

2.5 Treatment Options

Once a technician determines that a threshold for control has been met, there are a number of treatment options available. In the case of larvicides, there are bacterial controls (*Bacillus thuringiensis* var *israelensis*, and *Bacillus sphaericus*) and insect hormone control (methoprene). Of these, some are short acting while others are longer acting. Of course, there is also the option to perform a physical control, requiring no pesticides at all. These options will be discussed below.

2.5.1 Non-pesticide control (physical control)

A technician may find a larval development site and encourage the site to be drained (*e.g.* a pool of water in a farmer's field can be ditched or filled-in). In the case of high adult numbers, landowners may be encouraged to wear insect repellent and pants and long-sleeved shirts. Other options for non-pesticide control are outlined in Section 2.1.1 and these will always be considered first, before any pesticide application.

2.5.2 Control Options for Larval Mosquitoes

The RDOS will consider the use of any of the registered mosquito larvicides listed below, and this PMP may be updated with any new larvicides that become registered in Canada during the course of this PMP. The list of larvicides proposed for use in the RDOS under this PMP is listed in Table 1 and includes formulations of *Bacillus thuringiensis* var *israelensis*, *Bacillus sphaericus* and methoprene.

2.5.2.1 *Bacillus thuringiensis* var *israelensis*

The majority of the larval treatment within the RDOS will be with granular larvicides containing the active ingredient *Bacillus thuringiensis* var *israelensis* (*Bti*) (trade names Vectobac, Aquabac and/or Teknar). These products are formulated with byproducts of the metabolism of the bacterium *Bti* which is applied along with paraffin to crushed corncobs that serve as a carrier. *Bti* produces an endotoxin that contains five different proteins that can be digested in the alkaline gut of mosquito larvae. Once digested the proteins become toxic to the larvae and work to destroy the larvae's gut. The *Bti* products are effective against mosquitoes in the larval stage, and are applied by hand, backpack blower or by helicopter to standing water containing significant

populations of mosquito larvae. Application rates vary from 2.5 to 20 kilograms per hectare (with the higher rates applied to polluted or highly organic water), although most sites are treated at about 5 to 10 kilograms per hectare. Liquid formulations of these products are also available and may be used in the RDOS.

The benefits of the *Bti* larvicides are many. *Bti* larvicides are considered to be very specific to mosquito larvae and non-toxic to fish, amphibians, reptiles, mammals and most other insects. They are easy to apply and have no residual effect, along with being the most economical of the larval controls. *Bti* larvicides work best when applied to larvae in their 2nd and 3rd instars, however control can be achieved when applied to 1st and early 4th instar larvae as well. Death of the larvae usually occurs within 24 hours. This allows for technicians to be able to assess effectiveness soon after application. *Bti* products can be applied to practically any type of standing water including temporary and permanent pools, floodwater, snowmelt pools, irrigation pools, sewage lagoons, retention ponds, ditches, natural marshes, and catch basins.

There are very few disadvantages associated with the use of *Bti*. When applied according to the labeled rates, it is virtually non-toxic to all organisms aside from mosquito larvae. However, studies have shown that at application rates 10 to 1,000 times greater than the labeled rates, some effects have been documented on non-target larvae such as chironomids, biting midges and dixid midges. As the *Bti* products have no residual effect, only the larvae present at the time of application are affected. In habitats where multiple generations of larvae appear, more than one application of larvicide may be necessary. Another possible disadvantage is the short window for treatment with optimum control of the larvae in the 2nd and 3rd instars.

2.5.2.2 *Bacillus sphaericus*

Bacillus sphaericus is another biological larvicide registered for use in Canada. It is sold under the trade name VectoLex. The mode of action of the bacteria is similar to *Bti* in that it produces toxins that attack the gut of mosquito larvae.

The benefits of *Bacillus sphaericus* are also similar to those of *Bti* in that it is virtually non-toxic to non-target organisms while being very effective and specific to mosquito larvae. This product works better than *Bti* when applied to highly organic larval habitats and it has the added benefit of maintaining its effectiveness for up to 28

days and thus can control multiple generations of larvae with a single application. This product can be applied to any kind of standing water, as with *Bti* larvicides. The VectoLex Water Soluble Pouches (WSP) are only registered for use in catch basins at this time, and may be used to control mosquitoes in catch basins in years that vector control is an objective in the RDOS. If registration changes to allow VectoLex WSP to be applied to standing water other than catch basins, the RDOS will consider using these pouches accordingly. VectoLex CG is a granular product and is registered for use in standing water outside of catch basins.

The greatest disadvantage of *Bacillus sphaericus* is its cost. At present it the most costly of the larvicides and therefore it is economical to only consider its use in larval development sites where multiple generations of larvae are known to occur. In these cases, the increased cost of the larvicide may be warranted as fewer applications would be required over the course of the summer.

2.5.2.3 Methoprene

The final type of larvicide that may be used by the RDOS is methoprene (trade name Altosid). This larvicide is a mosquito juvenile growth hormone. It is formulated in pellets for use in open water (or catch basins) and as briquets for use in catch basins. This product slowly releases into larval development sites over a specified time period (approx 30 days for pellets and 60 days for briquets). The hormone prevents pupal mosquitoes from developing into their adult stage and they die as pupae, unable to feed.

Methoprene has a benefit over the biological products in that the pellets can be applied to water that may periodically dry-up and when wetted again, the product will begin to release methoprene and act on new generations of mosquitoes. It is considered safe for applicators to use without significant protective gear and is environmentally friendly. Because the larvae are allowed to develop to their pupal stage, they are present in the water for a longer time than with the bacteria controls and therefore are available to feed natural predators in the habitat.

There are some disadvantages associated with the application of methoprene. At present, methoprene is much more expensive than *Bti*. In the laboratory, high doses of methoprene have been shown to be slightly toxic to non-target organisms such as some crustacean and fish. In the field, when applied according to the label, toxic

concentrations are not reached and the product is undetectable in the environment within a few days. However, Altosid Pellets will only be considered for use in man-made water bodies that would never become contiguous with running water and catch basins. Ideal locations include agricultural fields that are repeatedly flooded by over-irrigation and thus produce repeated generations of mosquitoes. The greatest disadvantage is that applicators are unable to assess the efficacy of a treatment until after the larvae pupate and therefore if the treatment failed, adult mosquitoes are inevitable.

Altosid briquets are only registered for use in catch basins and would be considered for use should vector control be an objective in any given year of the PMP.

According to the *Integrated Pest Management Regulation* Section 78(2), a pesticide-free zone is not required around standing water when applying the mosquito larvicides included in this PMP. However, in accordance with Section 78 (1) of the *Integrated Pest Management Regulation*, mosquito larvicides will not be applied in permanent, fish-bearing bodies of water or waters that have permanent, direct, surface-water connections with fish-bearing bodies of water. Also, larvicides will never be applied to any human drinking water sources. All applications will be done by individuals that hold valid British Columbia Pesticide Applicator Certificates in the Mosquito and Biting Fly Category or by individuals in direct visual or auditory contact with a certified applicator (one certified applicator may legally supervise no more than four non-certified applicators).

Table 1. List of larvicides that are included in this PMP (RDOS-MOS-PMP-2008/2013) and may be used within the Regional District Okanagan-Similkameen. Selection of the larvicide will be made by the applicator following assessment of the larva development habitat and available resources.

Trade Name	Formulation	Active Ingredient	PCP No.	Application Rate	Application Method*
Vectobac 200G	Granules	*Bacillus thuringiensis* var *israelensis* Strain H-14 (AM 65-52)	18158	3-10 kg/ha	ground or aerial
Vectobac 1200L	Liquid	*Bacillus thuringiensis* var *israelensis* Strain H-14 (AM 65-52)	21062	0.25-1.0 L/ha	ground or aerial
Aquabac 200G (5/8)	Granules	*Bacillus thuringiensis* var *israelensis* Strain H-14 (BMP 144)	26863	2.5-20 kg/ha	ground or aerial
Aquabac 200G (10/14)	Granules	*Bacillus thuringiensis* var *israelensis* Strain H-14 (BMP 144)	27374	0.5-1.0 mL of product per m^2	ground or aerial
Aquabac XT	Liquid	*Bacillus thuringiensis* var *israelensis* Strain H-14 (BMP 144)	26860	300-2400 mL/ha	ground or aerial
Aquabac II XT	Liquid	*Bacillus thuringiensis* var *israelensis* Strain H-14 (BMP 144)	27376	300-2400 mL/ha	ground or aerial
Teknar HP-D	Liquid	*Bacillus thuringiensis* var *israelensis* Strain SA3A	19241	0.3-1.2 L/ha	ground or aerial
Teknar Granules	Granules	*Bacillus thuringiensis* var *israelensis* Strain SA3A	19239	4.5-6.7 kg/ha	ground or aerial
Altosid Pellets	Granules	methoprene	21809	2.8-11.2 kg/ha	ground
Altosid XR Briquets	36.4g Briquet	methoprene	27694	For catch basins up to 5500 L place 1 briquette per basin	ground
VectoLex WSP	10g water soluble pouch	*Bacillus sphaericus*	28009	1 pouch per catch basin	ground
VectoLex CG	Granules	*Bacillus sphaericus*	28008	5.6-16.8 kg/ha in water bodies & 0.56-1.68 g/m^2 of water surface area in tires	ground or aerial
VectoLex WDG	powder to be mixed with water	*Bacillus sphaericus*	28007	0.56-1.68 kg/ha	ground or aerial

*Ground applications may be done by hand and/or with blowers and/or with misters. Aerial applications may be with helicopter.

2.5.3 Selection of a Treatment Method

Once a decision has been made to conduct a treatment, the applicator must first decide which product they will use. The decision will be based on a combination of the following considerations:

FOR LARVAL TREATMENTS

1) the advantages and disadvantages of each pesticide as discussed in Section 2.5.2;
2) the life stage (instar) and species of the larvae (single generation mosquito, or multi-generational mosquito);
3) the characteristics of the larval habitat (high organics, intermittently dry, size and location of site, predator presence/absence);
4) the availability of the larvicide;
5) the cost of the larvicide; and
6) the proximity to fish-bearing water and the likelihood of intermittent connection to fish-bearing water.

The applicator must then decide which treatment method to use. In smaller sites, a gloved hand may be used to spread granular larvicide. In larger sites, a backpack blower or mister may be preferred as this equipment can blow granules or mist great distances and cuts down on the amount of walking an applicator may have to do. Blowers and misters can also be used to blow larvicide over deep water that an applicator would be unable to wade in.

Finally, aerial control may be selected. Aerial campaigns are costly, but are often the only means of finding, accessing and treating large areas of larval development habitat in a short time frame (while larvae are in appropriate instars). When river levels peak during spring freshet, huge areas of habitat often become active simultaneously and mosquito control staff is unable to treat all larvae before they pupate. Aerial control is an excellent choice in this circumstance as hundreds of hectares of larval development habitat can be treated in just a couple of days.

2.6 Treatment Evaluations

The final component of an Integrated Pest Management approach is that of treatment evaluation. Post-treatment evaluation can help to improve a program over time as applicators learn which pesticides, application rates, methods and timing worked best at each application site. Constant evaluation of a program and its results will allow RDOS staff to improve and refine their nuisance mosquito control program.

The *Integrated Pest Management Regulation* Section 78(4b) specifies that the efficacy of a mosquito larvicide be assessed by conducting pre-treatment and post-treatment larval samples of the water being treated. Certified RDOS pesticide applicators will conduct and record all pre-treatment monitoring as described in Section 2.3.2. Within 14 days following treatment, certified applicators will return to the larval development site to conduct post-treatment monitoring using the same methods of assessing larvae as described in Section 2.3.2 for pre-treatment monitoring. This information will be used to determine if the rate and type of pesticide application chosen for the location was suitable, and if the application failed, it will allow the applicator to plan for alternate methods of control.

3.0 Operational Information

The following sections describe the RDOS's plans for safe handling, preparing, mixing, applying and otherwise using pesticides. Much of the information included in the following sections is drawn directly from the *Integrated Pest Management Regulation* and the Handbook for Pesticide Applicators and Dispensers, 5th Ed. (Ministry of Environment, 1995).

3.1 Procedures for Safely Transporting Pesticides

The following procedures for safely transporting pesticides will be practiced by all RDOS staff working under this PMP. The *Integrated Pest Management Regulation* (Section 65(1)) legislates that pesticides must be kept, handled, stored and transported in the container in which it was originally packaged and with the label originally affixed by the manufacturer, or in a container designed for containing the pesticide and labeled accordingly. Also Section 33 (2) of the *Regulation* states that a "person who transports or causes or allows the transport of a pesticide must ensure that the pesticide is secured and

transported … in a manner that prevents the escape, discharge or unauthorized removal of the pesticide from the transport vehicle, and prevents the contamination of food or drink intended for animal or human consumption, household furnishings, toiletries, clothing, bedding or similar items that are transported with the pesticide."

Further, the Handbook for Pesticide Applicators and Dispensers, 5th Ed. (Ministry of Environment, 1995) outlines a number of general precautions to be taken during transport of pesticides, and the RDOS will adhere to the following practices:

1) all pesticide containers will be inspected for defects prior to transporting;
2) chemical pesticides will not be transported in the passenger compartment of any vehicle, nor will anyone ride in the back of a truck together with these pesticides;
3) pesticides will never be transported along with food, feed or consumer goods;
4) chemical pesticides will not be transported on wooden truck beds as it is difficult to clean wood in the case of a spill, and future items carried in the truck could become contaminated;
5) all pesticide containers will be secured to prevent spillage;
6) the driver of any vehicle transporting pesticides will be trained in spill clean-up and will carry, along with the pesticides, necessary equipment to contain and/or neutralize a spill;
7) limited amounts of pesticides shall be carried in any one vehicle. The quantity shall be no more than what is necessary for each project, except where transportation occurs between storage facilities;
8) pesticides shall be carried in a secure lockable compartment such as a locked storage box or a canopy; and
9) pesticides shall be transported separately from food and drinking water, safety gear and people.

3.2 Procedures for Safely Storing Pesticides

The RDOS will adhere to the following standards of the *Integrated Pest Management Regulation* with respect to the safe storing of pesticides:

1) a person who stores a pesticide will store it in a manner that minimizes hazards to human health and the environment (Section 33 (1));
2) all pesticides will be stored in the container in which it was originally packaged and with the label originally affixed by the manufacturer, or in a container designed for containing the pesticide and labeled with the trade name, chemical name, concentration of active ingredient and Pest Control Product number (Section 65 (1));
3) all pesticides will be stored separately from food intended for human or animal consumption (Section 66 (1a));
4) according to Section 66 (1b) all pesticides will be stored in a facility that is:
   (i) ventilated so that pesticide vapors are vented to the outside;
   (ii) not used for the storage of food intended for human or animal consumption;
   (iii) locked when unattended; and
   (iv) accessible only to persons authorized by the person storing the pesticide;
5) according to Section 66 (2), each door providing access to a storage facility will clearly bear the words “WARNING: CHEMICAL STORAGE — AUTHORIZED PERSONS ONLY" written in block letters”; and
6) according to Section 31, the RDOS will inform the local fire department of the pesticide storage location within 60 days after starting to store pesticides.

3.3 Procedures for Safely Mixing, Loading and Applying Pesticides

Vectobac 200G 1200L, Aquabac XT, Aquabac II XT, Teknar HP-D and VectoLex WDG are the only pesticides listed in this PMP that may require mixing. These pesticides may be mixed with water if this aids the applicator in obtaining a better distribution on the surface of the larval development habitat. The labels specify that the level of dilution is up to the applicator and is based on weather, the size of the larval development habitat and the method of application.

Typically, the mixing of pesticides is the most dangerous activity with respect to pesticide application, and special care should be taken at all times and mixing should only be done by certified applicators. Because each of the larvicides listed in our PMP that may require mixing, have minimal toxicity to humans, and they are all mixed with water only, these pesticides are not considered hazardous to mix.

Regardless, it is still prudent to follow the provincial recommendations for safe mixing, loading and applying pesticides. At the time of mixing, a spill kit should be nearby. Emergency phone numbers and a telephone will be present. The person mixing the pesticide will wear protective clothing as listed on the product labels, which may include gloves, boots, face shield, and hat. Before pesticides are applied, applicators will inspect all application equipment to ensure there are no leaks or needed repairs.

3.4 Procedures for Safe Disposal of Empty Pesticide Containers and Unused Pesticides

Empty pesticide containers can be considered a danger to the environment (although the products used in the RDOS are considered to be very safe). RDOS staff will dispose of empty containers as described on the manufacturer's product label. Also, the recommendations described in the Handbook for Pesticide Applicators and Dispensers, 5th Ed. (Ministry of Environment, 1995) will be followed and as a minimum, all pesticide containers will be emptied by draining them for 30 seconds and any that contained liquid larvicide will then be triple rinsed. To prevent someone from attempting to reuse the containers, they will be punctured or crushed and then taken to an approved landfill.

In the unlikely event that the RDOS has pesticide that will not be used, the Waste Management Branch of the Ministry of the Environment will be contacted and consulted as to protocols for disposing of the pesticide.

3.5 Procedures for Responding to Pesticide Spills

Spill treatment equipment will be ready and available at the storage site (including mobile storage), mixing and loading sites, and during all pesticide applications. All persons authorized and trained to work with the pesticides will be familiar with the protocol for containing and responding to spills. The spill equipment will include:

1) personal protective equipment;
2) absorbent material such as sawdust, sand, activated charcoal, vermiculite, dry coarse clay, kitty litter or commercial absorbent (for liquid formulations);
3) a long handled broom;
4) a shovel; and
5) water-proof waste-receiving container with lid and a pen to label the contents.

If a spill occurs, RDOS staff will follow the recommendations as described in the Handbook for Pesticide Applicators and Dispensers, 5th Ed. (Ministry of Environment, 1995):

1) the source of the spill will be contained;
2) people and animals will be kept away from the spill site and people will be prevented from walking through, or driving through the spill;
3) the product label or knowledgeable agencies will be consulted to determine the best course of action for clean-up of the spill;
4) if the spill is small enough to be handled without assistance, clean-up will begin immediately;
5) personal protective gear will be worn during clean up;
6) the spilled material should be stopped from spreading by creating a barrier with soil, sawdust, newspaper or spill kit dam;
7) absorbent material shall be spread over spills, if applicable, to absorb any liquid; and
8) the absorbent material shall be collected in water proof containers with the contents clearly labeled with the pesticide name, P.C.P. number and quantity of pesticide;
9) spills of granular or pellet formulated larvicides should be swept up and collected with a shovel and placed in a bucket for disposal or future use.

4.0 Environmental Protection Strategies & Procedures

The following sections describe the RDOS's plans for protecting the environment. Much of the information included in the following sections is drawn directly from the *Integrated Pest Management Regulation* and the Handbook for Pesticide Applicators and Dispensers, 5th Ed. (Ministry of Environment, 1995).

4.1 Strategies to Protect Community Watersheds and Domestic and Agricultural Water Sources

The RDOS will follow the guidelines contained in the *Forest Practices Code of British Columbia Act* to protect community watersheds, and will ensure that each of the steps listed below are conducted:

1) the location of community watersheds will be determined by selecting the "Community Watersheds" layer on the provincial interactive mapping site "Online Cadastre": http://srmwww.gov.bc.ca/sgb/IMF/index.html (hint- to view watersheds better, scroll to left of the words "Community Watersheds- Colour filled" in the "Layers" menu and there is a little multi-coloured icon that you can select and then change the colour of watershed to something brighter);
2) an adequate buffer zone will be maintained around no-treatment zones;
3) no mixing of liquid larvicides will occur within a community watershed; and
4) no pesticides will be stored within a community watershed.

In order to protect domestic drinking water and water for agricultural use, the RDOS will strictly adhere to all standards for pesticide-free zones (PFZs) and no treatment zones (NTZs) as specified in the *Integrated Pest Management Act and Regulations*. Table 2 lists the PFZ's and NTZs for mosquito control applications.

Table 2. Standards as described in the *Integrated Pest Management Regulation* (IPMR) for Pesticide Free Zones (PFZ) and No Treatment Zones (NTZ) to protect water during mosquito control activities.

Insecticide	Water Source	Regulation	Applicable Section from IPMR
Bacterial Larvicides	Water supply intake or well used for domestic or agricultural purposes, including water for livestock or for irrigation of crops.	Exempted from PFZ	71(12)
	Bodies of water and streams	Exempted from PFZ however no treatment allowed in permanent, fish bearing bodies of water or waters that have permanent, direct, surface-water connections with fish bearing bodies of water	78(2); 78(1)
Non-Bacterial Larvicides (methoprene)	Water supply intake or well used for domestic or agricultural purposes, including water for livestock or for irrigation of crops.	30m NTZ unless applicator is reasonably satisfied that the smaller zone will ensure that pesticide from the use will not enter the water supply intake or well.	71(3); 71(4)
	Bodies of water and streams	Exempted from PFZ however no treatment allowed in permanent, fish bearing bodies of water or waters that have permanent, direct, surface-water connections with fish bearing bodies of water	78(2); 78(1)

*Body of water does not include a human-made, self contained body or structure for water

4.2 Strategies to Protect Fish and Wildlife, Riparian Areas and Wildlife Habitat

Riparian areas are defined as the areas around bodies of water. These areas usually contain lush vegetation and high biodiversity (birds, insects, reptiles, amphibians, plants and mammals). Riparian areas are important for stream, lake and marsh health as they support vegetation that maintains bank stability and provides cover for water bodies to help maintain cooler water temperatures. With respect to pesticide applications, herbicides are generally considered the most dangerous pesticides in these ecosystems; and mosquito larvicides (as listed under this PMP) are of little concern.

Due to the low toxicity of the bacterial larvicides, applications will be conducted within riparian areas, however care will be taken to keep impacts on vegetation and soil at a minimum (*e.g.* attempt will be made to stay on paths and avoid trampling vegetation). Also, as per the *Integrated Pest Management Regulation*, fish habitat will be

protected as no larviciding will take place in fish bearing waters or waters with continuous surface water connections with fish bearing waters. Finally, all maintenance and fuelling of larviciding equipment will be done outside of the riparian areas.

4.3 Strategies to Prevent Contamination of Food Intended for Human Consumption

The larvicides proposed for use in this PMP will not cause contamination of food intended for human consumption. This is due to their physical properties and their use only in aquatic areas. However, general guidelines for safety will be followed by applicators (*e.g*. applicator will wash hands before eating and food will be stored separately from pesticides and equipment used for larviciding).

4.4 Pre-Treatment Inspection Procedures for Identifying Treatment Area Boundaries

Prior to larviciding, the applicator will consult maps and speak with landowners (or agency responsible for the land) to ensure that he or she has permission to treat the site, and the applicator will ensure that he or she is not treating in a permanent, fish bearing body of water or waters that have permanent, direct, surface-water connections with fish bearing bodies of water. No larviciding will take place on private land without the landowner's permission.

4.5 Procedures for Maintaining and Calibrating Pesticide Application Equipment

For granular larvicides, the applicator is responsible for determining if the application rate is within the label specifications. All hand, blower and helicopter applications are done by "eye-balling" the spread pattern of the granules on the water surface and then determining the actually weight of the product that was applied.

In order to calibrate the liquid sprayers, they will be filled with pesticide and then tested for flow rate by measuring the volume of liquid pumped through the system during a one minute interval. The flow rate, and application procedure will be determined by reading the label on the product to be sprayed.

4.6 Procedures for Monitoring Weather Conditions and Strategies for Modifying Pesticide Application Methods for Different Weather Conditions

RDOS staff will monitor weather and environmental conditions prior to and during larviciding applications. All weather monitoring during the course of the application should be done on site. If wind speeds are too high during larviciding activities, granules or liquid spray can be blown off course and miss the treatment areas, either during ground or aerial applications. It will be up the applicator to determine whether or not they can accommodate for wind speed and still apply the larvicides effectively. Precipitation rarely interferes with ground application of larvicides, however during heavy rain, aerial applications of granules may be stopped as water can cause the granules to clump in the application equipment and therefore application rates can be affected. No applications will be made when the temperature is higher than 35^0C as high temperatures can cause degradation of granules stored in trucks and equipment prior to application.

5.0 Records and Reporting

Under the *Integrated Pest Management Regulation* the RDOS is required to maintain records of all pesticide applications and submit an Annual Record of Pesticide Use and an annual Notice of Intent to Treat.

5.1 Treatment Records

The RDOS will maintain, for three years from the date of treatment, records of all pesticide applications including:

1) treatment location;
2) pre-treatment monitoring results (larval counts, instars, etc);
3) treatment date and time;
4) type of pest targeted (mosquito larvae);
5) trade name of pesticide used and its PCP number;
6) method of application;
7) rate of application;
8) total quantity of pesticide used;
9) relevant meteorological conditions (*i.e.* wind, precipitation, temperature);

10) results of post-treatment monitoring and evaluation (larval counts and instars post-treatment); and
11) if the applicator decides that the 30 m non-treatment zone around a water supply intake or well used for domestic or agricultural purposes may be reduced, the information on which the decision was based.

5.2 Records of Larval Development Sites

The RDOS will maintain updated records of all larval development sites, including:

1) GPS location or description of the location of the site;
2) name, address and phone number of owner or manager of the treatment site; and
3) information concerning no-treatment areas or areas where permission has not been granted by the landowner.

5.3 Annual Report of Pesticide Use

The RDOS will submit an Annual Report of Pesticide Use to the Administrator of the *Integrated Pest Management Regulation* by January 31 of every year, as summary of the previous calendar year's use including:

1) the name and address of the RDOS and their confirmation number;
2) the trade name , PCP registration number, active ingredient name(s) and amount of pesticide product used in kilograms; and
3) the total area treated with each product.

5.4 Annual Notice of Intent to Treat

The RDOS will provide a Notice of Intent to Treat to the Administrator *Integrated Pest Management Regulation* 21 days prior to the commencement of the project in each calendar year of the PMP confirmation. The Notice of Intent to Treat will contain the following information:

1) the name and business location of the confirmation holder;
2) a description of the proposed treatment locations for the calendar year and a map or diagram that clearly identifies those locations;
3) a description of the proposed treatment for each area, including the pesticide to be used and its method of application; and

4) the total area of the treatment areas in the proposed treatment locations for the calendar year.

6.0 Consultation

The *Integrated Pest Management Regulation* specifies that person preparing a PMP must conduct public consultations. The *Integrated Pest Management Regulation* specifies that the consultation must include newspaper notices and "reasonable" efforts to contact and consult within individuals who have the potential to be impacted by proposed pesticide use under the PMP. The Regional District completed all necessary consultations as described in the following sections.

6.1 Consultation Process

Public consultation with respect to this PMP will be conducted between April 3rd, 2013 and May 18th, 2013. A newspaper advertisement (Appendix C) has been placed in newspapers throughout the Regional District and will print on two occasions in each newspaper within a two-week period (Table 3). The advertisement included all components in accordance with the *Integrated Pest Management Regulation*, including the statement that "persons wishing to contribute information about a proposed treatment site, relevant to the development of the Pest Management Plan, may send copies of the information to the RDOS within 30 days of the publication of this notice." The newspaper advertisement also included an invitation to attend a public open house at the RDOS on office on April 25th between the hours of 3 and 7 pm. In addition to the required advertisements in the local newspaper, the RDOS will include a copy of the advertisement on their website for the entire duration of the consultation period. The advertisement informed interest parties that the PMP may be viewed in hardcopy at the Regional District office, or electronically on the web at www.RDOS.bc.ca.

Letters with links to the draft PMP will be sent via registered mail to the Penticton Indian Band, Osoyoos Indian Band, Upper Similkameen Indian Band, Lower Similkameen Indian Band, Okanagan Nation Alliance, Westbank First Nation, Coldwater Indian Band, Siska Indian Band, Cook's Ferry Indian Band, Upper Nicola Band, Ashcroft Indian Band, Spuzzum First Nation, Union Bar Band, Niaka'pamux Nation Tribal Council, and the Nooaitch Indian Band on April 8th. Accompanying letters will invite

these First Nation groups to provide information or express concerns they may have with respect to this PMP and its potential effects on their traditional lands, aboriginal rights, treaty rights, or cultural values (Appendix E). A follow-up letter will be sent on April 22nd, 2013 and an email will be sent on April 26th, 2013.

Table 3. Newspapers and publishing dates of the RDOS notifications of the development of a pest management plan (Appendix C) for nuisance mosquito control.

Name of Newspaper	First Publishing Date	Second Publishing Date
Keremeos Review	April 11, 2013	April 18, 2013
Penticton Western	April 5, 2013	April 12, 2013
Oliver Chronicle	April 10, 2013	April 17, 2013
Osoyoos Times	April 10, 2013	April 17, 2013
Penticton Herald	April 5, 2013	April 12, 2013
Similkameen News Leader	April 8, 2013	April 15, 2013
Similkameen Spotlight (Princeton)	April 10, 2013	April 17, 2013
Summerland Review	April 11, 2013	April 18, 2013
Oliver Daily News	April 3, 2013	April 10, 2013

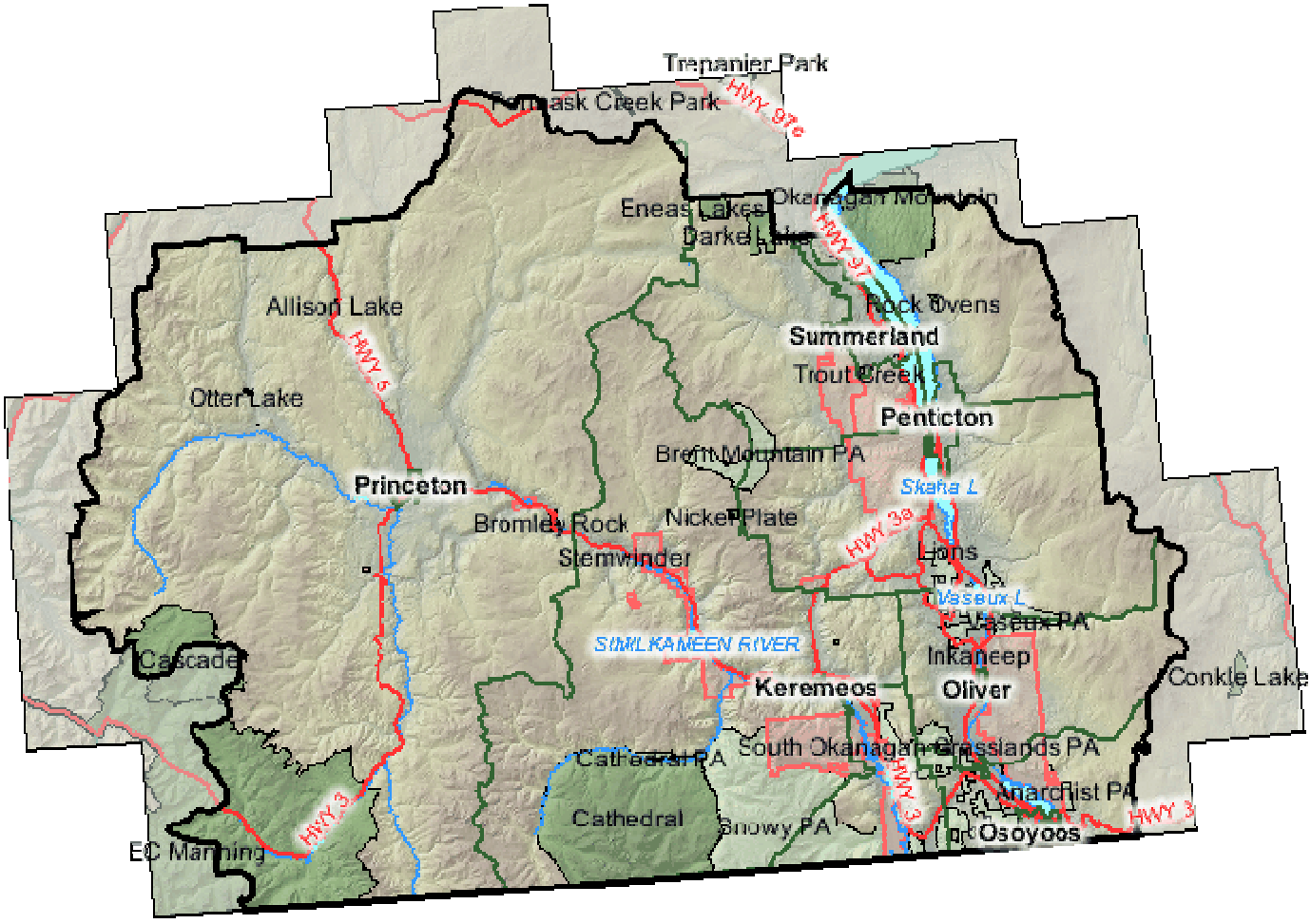
6.2 Public Response to the Proposed PMP

On April 11th, 2013, Donna Howard contacted the Regional District Okanagan Similkameen. Randy Houle returned the call on April 15th, 2013. Donna saw the PMP Notice in the newspaper and asked if we could treat her pond as she did not want it to be the cause of mosquitoes in her area. She also expressed concerns about the frogs in her pond and asked if the product was toxic to frogs. Randy explained that the RDOS uses *Bacillus thuringiensis* var *israelensis* and that this larvicide only targets mosquito and black fly larvae. Donna had no concerns with the draft PMP and was happy that the RDOS will be monitoring her pond for mosquito larvae in the near future.

Christina and James Moring attended the open house at the Regional District Okanagan-Similkameen office in Penticton on April 25th at 3:35pm. They had no issues with the draft PMP but expressed their concerns about a possible mosquito breeding site near their house. They had concerns about the West Nile virus and the nuisance that mosquitoes can cause. The RDOS will be visiting this site in the near future.

There were no other responses from the public and no requests for advanced notification prior to annual pesticide application.

Appendix A: Map of the Geographic Boundaries Described within this PMP



The above map shows the boundaries of the Regional District of the Okanagan-Similkameen. Mosquito larva and adult treatments may be conducted anywhere within these boundaries except within the Village of Keremeos and Electoral Area 'E'. Maps detailing the locations of known larval development sites can be viewed at the Regional District Okanagan-Similkameen office.

Appendix B: Checklist of Required Information for the Development of a Pest Management Plan (from Section 58 if the *Integrated Pest Management Regulation*)

Checklist for required contents of a Pest Management Plan (from Section 58 of the *Integrated Pest Management Regulation*).

	Section of *IPMR*	Task	Associated Section Within this PMP
☒	58 1(a)	Description of geographic boundaries with maps etc	Section 1.1, Appendix A
☒	58 1(b)	Person responsible for managing pests in relation to land described above	Section 1.2
☒	58 1(c)	Principal contact for information	Section 1.2
☒	58 2(a)	Description of the program to prevent organisms from becoming pests	Section 2.1
☒	58 2(b)	Description of pest identification or techniques for pest identification	Section 2.2
☒	58 2(c)i	Description of monitoring methods of environment and target population before and during pesticide use	Section 2.3
☒	58 2(c)ii	Description of monitoring frequency of above before and during pesticide use	Section 2.3
☒	58 2(c)iii	Collected data of 2(c)i before and during pesticide use	Section 2.3
☒	58 2(d)i	Treatment threshold and description of how it was chosen	Section 2.4
☒	58 2(d)ii	how treatment threshold will be applied	Section 2.4
☒	58 2(e)i	Description of all possible treatment methods	Sections 2.5.1, 2.5.2,
☒	58 2(e)ii	Rational for treatment selection	Sections 2.5.1, 2.5.2,
☒	58 2(e)iii	Benefits and limitations for each possible method under sec 2(e)i	Sections 2.5.1, 2.5.2,
☒	58 2(e)iv	Description of how treatment method chosen	Section 2.5.3
☒	58 2(f)i	Description of monitoring methods of pesticide efficacy and environmental effects	Section 2.6
☒	58 2(f)ii	Description of frequency of monitoring of above	Section 2.6
☒	58 2(f)iii	Description of data collected for 2(f)i	Section 2.6
☒	58 3(a)i	Procedures for safely transporting pesticides	Section 3.1
☒	58 3(a)ii	Procedures for safely storing pesticides	Section 3.2
☒	58 3(a)iii	Procedures for safely mixing, loading, and applying pesticides	Section 3.3
☒	58 3(a)iv	Procedures for the safe disposal of empty pesticide containers and unused pesticides	Section 3.4
☒	58 3(a)v	Procedures for responding to pesticide spills	Section 3.5
☒	58 3(b)i	Strategies to protect water sources and community watersheds	Section 4.1
☒	58 3(b)ii	Strategies to protect fish, wildlife, riparian areas & wildlife habitat	Section 4.2
☒	58 3(b)iii	Strategies to prevent human food contamination	Section 4.3
☒	58 3(b)iv	Pre-treatment procedures for identifying treatment area boundaries	Section 4.4
☒	58 3(b)v	Procedures for calibrating application equipment	Section 4.5
☒	58 3(b)vi	Procedures for monitoring weather conditions	Section 4.6

Appendix C: Copy of the advertisement published in local newspapers (Table 3) between April 3rd, 2013 and April 18th, 2013

DEVELOPMENT OF A PEST MANAGEMENT PLAN

Pest Management Plan Number: RDOS~MOS~PMP~2013/2018

Applicant: Regional District of the Okanagan-Similkameen (RDOS).101 Martin Street, Penticton, BC V2A 5J9. Tel: (250) 492-0237 Fax: (250) 492-0063 Attention: Doug French

Application Method: Larval Control: backpack blower, helicopter, & hand application.

Pesticides: The active ingredients and trade names of the pesticides that the RDOS intends to use under this plan include: *Bacillus thuringiensis israelensis* (Vectobac 200G, Vectobac 1200L, Aquabac 200G, Aquabac XT, Aquabac II XT, Teknar G, Teknar HP-D); *Bacillus sphaericus* (VectoLex WSP, VectoLex CG and VectoLex WDG); and methoprene (Altosid XR Briquets and Altosid Pellets).

Location: Within the boundaries of the Regional District of the Okanagan-Similkameen including the municipalities of Penticton, Oliver, Osoyoos, Princeton and Summerland, and Electoral Areas A, B, C, D, F, G and H. Treatments will be conducted on public, private and crown lands within the above listed municipalities and Electoral Areas.

The selection of insecticides has been chosen to target mosquito populations in the most environmentally responsible manner.

The proposed duration of the PMP is from May 18th, 2013 to May 18th, 2018.

A draft copy of the PMP and maps of the proposed treatment areas may be examined in detail at the address listed above. The draft PMP can also be viewed on the RDOS website at www.RDOS.bc.ca

A person wishing to contribute information about a proposed treatment site, relevant to the development of the Pest Management Plan, may send copies of the information to the applicant at the address above within 30 days of the publication of this notice.

A public open house will be held at the Regional District office (address above) on April 25th, 2013 from 3:00-7:00pm.

Appendix D: Sample Letter sent to First Nation groups requesting input concerning this PMP.

101 Martin Street, Penticton, British Columbia V2A 5J9
Tel: 250.492.0237 Fax: 250.492.0063
Toll Free: 877.610.3737
Email: info@rdos.bc.ca

Regional District
Okanagan Similkameen
101 Martin Street
Penticton, BC V2A 5J9

April 8th, 2013

Chief and Council
Penticton Indian Band
RR2, Site 80, Comp 19
Penticton, BC V2A 6J7

To whom it may concern:

The Regional District Okanagan-Similkameen is developing a Pest Management Plan for the control of nuisance mosquitoes within the Regional District. The Proposed Plan (No. RDOS-MOS-PMP-2013/2018) is now complete and in the Public and First Nation Consultation phase of development. The plan can be viewed at www.rdos.bc.ca or it can be mailed at your request.

In accordance with the Ministry of the Environment, we are required to ask you the following questions;

a. What traditional activities have been or are being practiced within the proposed area and where have they taken place?
b. Do you have any technical or traditional knowledge of the area under application which would assist us in assessing the impact of this application on your traditional programs?

If you would like to submit information pertaining to the plan, please do so in writing by May 13th, 2013. If you would prefer to offer comments in person, please contact Doug French, Public Works Manager for the Regional District Okanagan-Similkameen (250) 490-4103. If we have not heard from you by May 13th, 2013, we will proceed under the assumption that your community has no opposition to our Plan.

If you would like to speak to a Ministry representative directly about the proposed pesticide use outlined in this letter, please contact the following Regional Office:

Integrated Pest Management Program
Ministry of Environment
102 Industrial Place
Penticton BC V2A 7C8
Tel. (250) 490-8220

Yours Truly,

Liisa Bloomfield, P.Eng.
RDOS Engineer

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