SEPA ENVIRONMENTAL CHECKLIST
FOR
DRAFT AQUATIC MOSQUITO CONTROL NPDES GENERAL PERMIT

A. background

1. Name of proposed project, if applicable:

   Draft Aquatic Mosquito Control NPDES General Permit

2. Name of applicant:

   Washington State Department of Ecology

3. Address and phone number of applicant and contact person:

   Nathan Lubliner
   Department of Ecology
   PO Box 47696
   Olympia, WA 98504-7696
   360-407-6563

4. Date checklist prepared:

   March 4, 2015

5. Agency requesting checklist:

   Washington State Department of Ecology

6. Proposed timing or schedule (including phasing, if applicable):

   The public comment period for the SEPA determination will run concurrently with the public review of the draft permit documents.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   No.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   Best Management Practices for Mosquito Control:
   https://fortress.wa.gov/ecy/publications/publications/0310023.pdf

   Reasonable Potential Determination
   http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/mosquito/permit2010/rpd012210.xlsx

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

   No.

10. List any government approvals or permits that will be needed for your proposal, if known.

Applicators (Permittees) must obtain the appropriate pesticide applicators license from the Washington State Department of Agriculture.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The Draft Aquatic Mosquito Control General Permit covers all mosquito control activities that result in a discharge of larvicides or indirect discharge of adulticides to waters of the state of Washington.

This permit does not apply to homeowner use of residential pesticides.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

This draft permit would cover discharges to Waters of the state of Washington.

This permit does not apply to:

1. Federal lands in Washington where a federal agency made the decision to apply or is the ***entity*** applying larvicides or adulticides.
2. ***Indian Country*** and ***trust or restricted lands*** except portions of the Puyallup Reservation as noted. Puyallup Exception: Following the Puyallup Tribe of Indians Land Claims Settlement Act of 1989, 25 U.S.C. §1773; this permit does apply to land within the Puyallup Reservation except for discharges to surface water on land held in trust by the federal government.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site
(circle one): Flat, rolling, hilly, steep slopes, mountainous,
other _____

N/A

b. What is the steepest slope on the site (approximate percent slope)?

N/A

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

N/A

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

N/A

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

N/A

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

N/A

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

N/A

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

N/A

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Some discharges that may occur under this proposed draft permit would create aerosols of the insecticide used during application. The duration of the impact from the aerosols would be temporary and short lived since they would not last much longer than the pesticide application process.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

N/A

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

The adulticide labels require that application only occur when wind speeds are 10 mph or less. In addition, application of aculticides is performed during those periods of time when adult mosquitos are most active (after sunset and before sunrise). This limits the time and duration that adulticides can be effectively applied.

3. Water

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes. Mosquito control generally takes place in and around water bodies across the state.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

N/A

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

N/A

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

N/A

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

Yes. The development of the proposed Aquatic Mosquito Control NPDES General Permit is specifically to condition the discharge of potential pollutants that occur as a result of mosquito control activities. The chemicals that are being proposed for discharge can be found in the non-project portion of this checklist. The volume of the discharge will be project dependent and will follow use rate restrictions on the FIFRA label for the product being used for mosquito control.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

N/A

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

N/A

2) Could waste materials enter ground or surface waters? If so, generally describe.

Yes. The development of the proposed Aquatic Mosquito Control NPDES General Permit is specifically to condition the discharge of potential pollutants that would occur as a result of mosquito control activities. The chemicals that are being proposed for discharge can be found in the non-project portion of this checklist. The volume of the discharge will be project dependent and will follow use rate restrictions on the FIFRA label for the product being used for mosquito control.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

N/A

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

FIFRA label requirements limit the amount of pesticide that can be applied at any one time which will limit the amount of pesticide available to runoff with stormwater.

4. Plants

a. Check the types of vegetation found on the site:

N/A

____deciduous tree: alder, maple, aspen, other
____evergreen tree: fir, cedar, pine, other
____shrubs
____grass
____pasture
____crop or grain
____Orchards, vineyards or other permanent crops.
____wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

N/A

c. List threatened and endangered species known to be on or near the site.

N/A

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

N/A

e. List all noxious weeds and invasive species known to be on or near the site.

N/A

5. Animals

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other _____

N/A

b. List any threatened and endangered species known to be on or near the site.

See the discussion on vulnerable species in question #2 of the non-project portion of this checklist.

c. Is the site part of a migration route? If so, explain.

N/A

d. Proposed measures to preserve or enhance wildlife, if any:

N/A

e. List any invasive animal species known to be on or near the site.

N/A

6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

N/A

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

N/A

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

N/A

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

See the discussion in the non-project portion of this checklist.

1) Describe any known or possible contamination at the site from present or past uses.

N/A

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

N/A

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

N/A

4) Describe special emergency services that might be required.

N/A

5) Proposed measures to reduce or control environmental health hazards, if any:

N/A

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

N/A

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

N/A

3) Proposed measures to reduce or control noise impacts, if any:

N/A

8. Land and shoreline use

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

N/A

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

N/A

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

N/A

c. Describe any structures on the site.

N/A

d. Will any structures be demolished? If so, what?

N/A

e. What is the current zoning classification of the site?

N/A

f. What is the current comprehensive plan designation of the site?

N/A

g. If applicable, what is the current shoreline master program designation of the site?

N/A

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

N/A

i. Approximately how many people would reside or work in the completed project?

N/A

j. Approximately how many people would the completed project displace?

N/A

k. Proposed measures to avoid or reduce displacement impacts, if any:

N/A

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

N/A

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:

N/A

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

N/A

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

N/A

c. Proposed measures to reduce or control housing impacts, if any:

N/A

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

N/A

b. What views in the immediate vicinity would be altered or obstructed?

N/A

c. Proposed measures to reduce or control aesthetic impacts, if any:

N/A

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

N/A

b. Could light or glare from the finished project be a safety hazard or interfere with views?

N/A

c. What existing off-site sources of light or glare may affect your proposal?

N/A

d. Proposed measures to reduce or control light and glare impacts, if any:

N/A

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

N/A

b. Would the proposed project displace any existing recreational uses? If so, describe.

N/A

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

N/A

13. Historic and cultural preservation

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe.

N/A

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

N/A

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

N/A

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

N/A

14. Transportation

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

N/A

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

N/A

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

N/A

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

N/A

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

N/A

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

N/A

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

N/A

h. Proposed measures to reduce or control transportation impacts, if any:

N/A

15. Public services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

N/A

b. Proposed measures to reduce or control direct impacts on public services, if any.

N/A

16. Utilities

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

N/A

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

N/A

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee: Bill Moore, P.E.

Position and Agency/Organization:
WA State Department of Ecology, Water Quality Program/PDS Section Manager

Date Submitted: 3/4/2015

D. supplemental sheet for nonproject actions

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

This proposal would result in either direct or incidental (indirect) discharge of insecticides to waters of the state. The insecticides that are proposed for use in the draft are:

1. Bacillus sphaericus (H-5a5b)
2. Bacillus thuringiensis israelensis (Bti)
3. Malathion
4. Methoprene

5. Monomolecular Surface Films (MSF)
6. Paraffinic White Mineral Oil
7. Spinosad
8. Temephos
9. Etofenprox
10. Naled
11. Natural Pyrethrins
12. Permethrin
13. Piperonyl Butoxide (PBO)
14. Prallethrin
15. Resmethrin
16. Sumithrin (d-phenothrin)

To estimate the potential for adulticides to indirectly enter water Ecology developed a Reasonable Potential Determination document which can be found here:
http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/mosquito/permit2010/rpd012210.xlsx

The proposed draft permit has the potential to temporarily increase exhaust emissions to the air through application of the above chemicals by aircraft, boat or vehicle.

The proposed draft permit has the potential to temporarily increase pesticide discharge to the air through application of the above chemicals by aircraft, boat or vehicle.

The proposed draft permit has the potential to temporarily increase production of noise through application of the above chemicals by aircraft, boat or vehicle. Terrestrial applications of adulticides typically occurs at dawn and dusk when mosquitos are most active.

Proposed measures to avoid or reduce such increases are:

Permittees must follow the EPA approved FIFRA Label. The FIFRA Label provides limits on the application of the pesticide product.

Permittees who plan to use adulticides to manage mosquito populations must complete an IPM plan to address planning and controls around the discharge of adulticides. Permittees who only apply larvicides may use the Ecology publication "Best Management Practices for Mosquito Control, May 2004 (publication number 03-10-023) or equivalent in place of developing their own IPM plan. If the Permittee later decides to include adulticides in its mosquito control operations, it must develop an IPM plan prior to using adulticides.

Compliance with the proposed draft permit would require permittees to follow FIFRA, the Washington Pesticide Control Act and the Washington Pesticide Application Act.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Discharges conducted under the proposed draft permit are for insecticides and are not anticipated to affect plants.

Discharge to marine waters have the potential to occur under this permit either through incidental over-spray of adulticides or through treatment of estuarine water with larvaecides. Though discharge to marine waters is not prohibited by this permit; Ecology is not aware of any discharge to marine waters under previous issuances of this permit.

A general overview of the chemicals being proposed for inclusion in the draft permit are given below along with their potential impacts animals and aquatic life. The information provided below is taken from the Fact Sheet For The Draft Aquatic Mosquito Control NPDES General Permit.

LARVICIDES

The permit authorizes the discharge of several larvicidal active ingredients when an entity is working to control mosquitoes. The active ingredients included for use in the permit are Bacillus sphaericus (H-5a5b), Bacillus Thuringiensis israelensis, Methoprene, Monomolecular surface films, Spinosad, Malathion, and Temephos.

Bacillus thuringiensis israelensis (Bti)

Bacillus thuringiensis, subspecies israelensis (Bti) is a naturally occurring soil bacterium that can effectively kill mosquitoes during the larval stage of development. Bti is an endospore-forming bacterium that is ingested by the actively feeding larvae. When the bacteria Bti encysts, it produces a protein crystal toxic to mosquito larvae. Once the bacteria have been ingested, the toxin disrupts the lining of the larvae's intestine causing it to stop eating and die. Bti is the primary material used for mosquito control because of its low toxicity to non-target species. Bti is highly effective against the first through third larval instars of mosquitoes (family Culicidae), blackflies (Family Simuliidae) and has some virulence against certain other Dipteran Families, especially midges (Family Chironomidae). Bti has been extensively studied for effects on non-target organisms and environmental consequences of use with no reported adverse effects. It is not toxic to bees. According to several studies, when applied at field application rates, Bti has no reported effect on fish and amphibians. Studies have also found no effect on warm-blooded mammals. Labels indicate that direct contact with the products may cause mild eye or skin irritation.

Bti products are available in liquid, pellet, granular, and briquette formulations. The type of Bti formulation influences the activity of the product. Generally, Bti does not persist long after application, with toxicity persisting from 24 hours to over one month when the longer lasting formulations are used.

Larval toxicity can depend on the species, its feeding activity and other possible factors such as UV light, water quality, pH, temperature, agitation, and sedimentation. Commercially available Bti strains are sold under several names, including Aquabac, Bactimos, Bonide Mosquito Beater "Plunks", Healthy Ponds, Sentry, Summit Bti Briquettes, Teknar and Vectobac. A number of Bti products are available for residential use in water bodies, such as lined ornamental ponds, and are sold under various trade names such as Bayer Advanced Garden Mosquito Preventer, Beckett Skeeter Stopper, Mosquito Depth Charges, Mosquito Dunks, Mosquito Bits Quick-Kill, and Spectracide Mosquito Stop.

Bacillus sphaericus (Bs)

Bacillus sphaericus is a naturally occurring (where does it occur), spore-forming bacterium, which produces a protein endotoxin at the time of sporulation. The toxin is only active against the larval stage and must be ingested and digested before it activates. B. sphaericus has the unique property of being able to control mosquito larvae in highly organic aquatic environments such as manure waste lagoons and stormwater catch basins.

B. sphaericus can offer up to six weeks of control in many habitats because the protoxins and spores can remain suspended in the water column for extended periods and due to the recycling of bacteria in dead larvae. Duration of control will depend upon habitat factors such as water depth, flushing, water chemistry and frequency of oviposition to maintain the recycling process. Vectolex, the trade name for B. sphaericus, is available in corncob granule, water dispersible granule, and water dispersible pouch formulations.

B. sphaericus was first registered for the control of Culex mosquitoes but its uses have been expanded to include control of several Aedes, Anopheles, Ochlerotatus, Psorophora and Coquilettidia species. B. sphaericus is not acutely toxic to freshwater and saltwater invertebrates, honeybees, mayfly larvae, does not appear to be harmful to fish and other marine life, and is not toxic to birds on a sub-chronic basis. In tests, B. sphaericus was not pathogenic, infective or toxic in laboratory animals by the oral, dermal, pulmonary and intravenous routes of exposure. In humans, mild skin and eye irritation can occur with direct contact.

Methoprene
Methoprene is a compound that mimics the action of an insect growth-regulating hormone and prevents the normal maturation of insect larvae. Unable to metamorphose, the mosquitoes die in the pupal stage. Methoprene is classified as a biochemical pesticide because it controls mosquito larvae by interfering with the insect's life cycle rather than through direct toxicity. Methoprene is available in numerous formulations and sold under the product names: Zoecon Altosid, Biosid, and Strike. Formulations labeled for residential use are sold under the names Pre-Strike and Vet-Kem.

Studies indicate that methoprene is of low toxicity and poses little risk to people when used according to label instructions. Methoprene was not shown to have any significant toxicological effects in the standard battery of toxicity studies used to assess human health effects. The pesticide has very low acute oral and inhalation toxicity potential and is not an eye or skin irritant. Methoprene is also of low acute dermal (skin) toxicity and is not a human skin sensitizer.

In laboratory tests, the toxicity of methoprene to birds and fish is low, and it is nontoxic to bees. Field studies involving methoprene have shown that it has no lasting adverse effects on populations of invertebrates or other non-target aquatic organisms when used according to label instructions for mosquito control. Methoprene mosquito control products present minimal acute and chronic risk to freshwater fish, freshwater invertebrates, and estuarine species. Methoprene is not persistent in the environment. It degrades rapidly in water, being susceptible to transformation by sunlight and microorganisms.

Monomolecular Surface Films
Monomolecular surface film (MMSF) is a non-petroleum surface oil that acts as a physicochemical agent by altering the mosquito's habitat. It belongs to the alcohol ethoxylate group of surfactants (products meant to increase product efficacy), which are used in detergent products. MMSFs disrupt the cohesive properties of water, which allow mosquitoes to use the water's surface as an interface for breeding. In effect, by making the surface "wetter," MMSFs drown mosquitoes.

MMSFs kill larvae and pupae by making it impossible for them to keep their breathing tubes above the water's surface. Mosquitoes that require little or no surface contact for breathing, such as Coquillettidia species, require properly timed applications at surface contacting stages–the pupae to emerging adult–for maximum impact. Since MMFs kill mosquitoes with a physical mechanism (rather than a toxic mechanism), it is not effective in habitats with persistent winds of greater than ten miles per hour, or in areas with very choppy water.

Some species, such as the midge, and some arthropods that require attachment to the water surface have been shown to be affected. MMSF is non-toxic to most non-target wildlife. According to EPA, MMSFs poses minimal risks to the environment when used according to FIFRA label directions. The green tree frog progressed normally from tadpole to adult through several generations after being exposed to a constant film presence for six months. MMSFs are not a skin irritant, is only a mild eye irritant on prolonged or repeated contact, and is considered to be non-toxic by animal tests. As with all pesticides, direct contact should be avoided. The film persistence is dependent on temperature, water flow, amount of bacteria in the water, and the duration and strength of the wind following application. MMSFs typically persist on the water's surface for 5-22 days.

Larvicidal Oils
Oils are used to form a coating on top of water to drown larvae, pupae, and emerging adult mosquitoes. Oils are petroleum or mineral based and are typically used as a product of last resort for the control of mosquito pupae, since this stage does not feed but does require oxygen. Oils can persist for 12 to 15 hours and then evaporate within a few days. Larvicide oils, if misapplied, can be toxic to fish and other aquatic organisms. Studies have shown that aquatic invertebrates, amphibians, waterfowl, furbearers and fish may be negatively affected. The mosquito control permit requires consultation and agreement of WDFW prior to using these products in areas where vulnerable (sensitive, threatened or endangered) species are present.

Malathion
Malathion is a broad spectrum organophosphate insecticide. It is used in agriculture, residential, pharmaceutical, and public health programs across the country to control a large number of pests.

Relatively resistant to UL degradation (photolysis), malathion is susceptible to hydrolysis in alkaline conditions. In neutral to alkaline conditions, the half-life of malathion is 1 to 2 weeks and in acidic conditions, the half-life is 107 days. Information included in the EPA revised RED for Malathion indicate that malaoxon (malathion primary metabolite) can remain stable for at least 72 hours, which is long enough to reach domestic drinking water supplies in some areas.

Half-life in soil is 1 to 25 days, depending on microbial activity, with higher activity resulting in a shorter half-life. Malathion does not adsorb to soils very well so it somewhat mobile in the soil, and has the potential to leach to groundwater.

Like other organophosphates, it works by disrupting the central nervous system through cholinesterase inhibition. Its primary metabolite is malaoxon, is also a cholinesterase inhibitor. Carboxyesterase activity in the body works to reduce the effects of malathion and malaoxon accumulation. Carboxyesterase are more active in mammals than insects, which can explain the higher toxicity in insects.

Malathion has a low toxicity to mammals, though at high doses a decrease in cholinesterase activity and some respiratory lesions during inhalation tests are seen. Symptoms of malathion poisoning include headache, nausea, vomiting, dizziness, muscle weakness, lethargy and anxiety. Life threatening exposure can cause respiratory distress, diarrhea, tremors, confusion, seizures and coma.

Malathion is highly toxic to beneficial insects and aquatic organisms (both vertebrates and invertebrates) during acute and chronic testing. Acute toxicity is not expected in reptiles as they have detoxification efficiency similar to mammals.

The National Marine Fisheries Service (NMFS) completed a biological opinion on the effects of EPA's malathion re-registration decision to endangered Pacific Salmon in 2008. NMFS concluded that EPA re-registration of malathion would jeopardize the existence of 27 endangered populations and adversely modify critical habitat for 25 endangered pacific salmonids. EPA is required to develop endangered species bulletins at the county level, or include FIFRA label requirements for California, Idaho, Oregon, and Washington that specify:

- Where ground applications are permitted:
- Where aerial applications are permitted
- Winds speeds during application are to be less than 10mph
- Agricultural uses will have a minimum of 20 feet of non-crop vegetation on the downhill side of the application areas immediately adjacent to any surface water that have a connection to salmonid bearing waters.
- Do not apply products when soil moisture is at field capacity of when a weather event is likely to produce run-off from the application site within 48 hours of application
- Report all incidents of fish mortality that occur within 4 days of application and within the vicinity of the application area.

More information about the NMFS biological opinion may be found at
http://www.nmfs.noaa.gov/pr/pdfs/pesticide_biop.pdf

However, use of malathion of public health purposes is exempt from the label or bulletin requirements related to the biological opinion.

Malathion use as a larvicide is restricted under Ecology's aquatic mosquito control permit. Malathion may only be used for control of mosquito larvae with Ecology approval after consultation between Ecology and DOH WDFW in

response to a public health emergency or pesticide resistance in a mosquito population. This limits the amount and times that malathion may be discharged to surface waters.

Temephos
Temephos is a broad spectrum, non-systemic organophosphate insecticide. It is registered for use only as a mosquito larvicide. It is a hydrophobic chemical but does bioaccumulate. Nearly 75% of temephos that is bioaccumulated is eliminated over time with no exposure.

Temephos is not very persistent in water, but binds tightly to soils and sediments, though its degredants do not which could lead to continued suspension or re-suspension in water. Half-life in soil is estimated at 30 days.

Like other organophosphates, Temephos works by disrupting the central nervous system through cholinesterase inhibition. It has a lower toxicity to mammals, but cholinesterase inhibition and reduced liver weights are noted in chronic exposure studies. Testing with rat found that while some temephos remained in the body, most of it was eliminated through feces and urine unchanged. Symptoms of poisoning include headache, sweating, nausea, vomiting, dizziness, loss of coordination, difficulty breathing, and death.

Depending on product formulation, temephos is moderately to very highly toxic beneficial insects and aquatic organisms (both vertebrates and invertebrates) during acute and chronic testing. It is also moderately to highly toxic to some species of birds.

Temephos use as a larvicide is restricted under Ecology's Permit. It is not permitted for use as an adulticide. Temephos may only be used for control of mosquito larvae in non-potable, highly polluted water, water with a high organic contentment (such as sewage lagoons, manure lagoons, or pastures, all of which must have no surface water run-off), or in response to pesticide resistance development within a specific population of mosquitoes. Ecology must approve the use of temephos after consultation between Ecology and WDFW in response to a public health emergency or pesticide resistance. This limits the amount and times that temephos may be discharged to surface waters.

ADULTICIDES
The Permit authorizes the incidental discharge of several adulticide active ingredients. The active ingredients included for use in the permit are Permethrin, Resmethrin, Sumithrin (d-phenothrin), Natural Pyrethrins, Naled, and Piperonyl Butoxide (PBO).

Pyrethrins and Pyrethroids(28-35,57,59,60)
Natural Pyrethrins are compounds isolated from the chrysanthemum flower (Chrysanthemum cinerariaefolium) with insecticidal properties. A number of synthetic derivatives have been created from pyrethrins and are referred to as "pyrethroids." Pyrethroids are more UV stable (resist UV degradation) and cost effective to produce.

As a group, pyrethrins and pyrethroids all have a similar mode of action. These chemicals interfere with nerve cell sodium channels that serve as part of the nervous system communication system, but it is unknown if all pyrethroids alter the same sodium channels.

Pyrethroids have a very low toxicity to humans and other larger mammals. EPA lists pyrethroid compounds as class 3 or 4 depending on exposure route for acute testing. Class 3 pesticides are rated slightly toxic by EPA, while class 4 is practically non-toxic.

Pyrethroids are toxic to beneficial insects such as butterflies, moths, and bee's. Insects of similar size (midges) may see an increase in mortality after pesticide application. Larger insects may also be affected. LD50 mortality is seen in Apis Mellifera (the domestic honeybee) at an average of 0.08 micrograms(ug)/bee permethrin.(36,40) EPA lists toxicity to bees from permethrin for dermal exposure at LD50 = 0.13 ug/bee and oral exposure at LD50 = 0.024 ug/bee.

EPA lists pyrethroids as highly toxic to very highly toxic to aquatic organisms. Results from acute testing of active ingredients on freshwater fish range from LC50 0.28 to 5.1 ppb. Chronic toxicity with freshwater invertebrates lists results for No Observed Adverse Effect Concentration (NOAEC) at 0.039 to 0.86 ppb.

Pyrethroids have a high affinity to binding to soils, waterbody sediments and suspended sediments. This high affinity to binding should greatly reduce the likelihood that pyrethroids will leach into groundwater but also reduces the chance for the pyrethroids to degrade due to UV light.

Piperonyl Butoxide (27,57,59,60)
Piperonyl Butoxide is a chemical that is added to many pesticide formulations. It increases the effect of pyrethrins and pyrethroids by acting as a synergist. PBO increases the insecticidal properties by reducing the effectiveness of the detoxification enzyme that works to eliminate pyrethroids from an insects system. This reduces the dose of pyrethroids necessary to cause mortality in mosquitoes other insects and some small mammals (rats, mice).

PBO is only slightly toxic to humans and other larger mammals, though some transient enzyme inhibition is observed. The target organ being the liver, chronic exposure leading to increases in liver weight. PBO also has a low to very low toxicity to birds.

As a single chemical test, PBO is moderately toxic to aquatic organisms. Acute testing of freshwater fish and invertebrates with a LC50's of 1.9 and 0.51ppm respectively. NOAEC's have also been estimated for PBO at 0.04ppm for freshwater fish and 0.03 for freshwater invertebrates.

PBO is not used as an adulticide or insecticide as a single active ingredient but always in as a synergist for a primary active ingredient.

Naled(29,57,59,60)
Naled is a broad spectrum, non-systemic organophosphate insecticide. It is registered for use as a mosquito adulticide. Naled has one metabolite that is also an organophosphate pesticide registered with EPA: dichlorvos (DDVP).

Like other organophosphates, Naled works by disrupting the central nervous system through cholinesterase inhibition. Symptoms of poisoning include headache, sweating, nausea, vomiting, dizziness, loss of coordination, difficulty breathing, and death.

Naled is moderately to highly toxic to birds, highly toxic to non-target insects (such as honeybees), moderately to very highly toxic to aquatic organisms and moderately toxic to mammals on an acute basis, with some chronic effects.

Naled use as an adulticide is restricted under Ecology's Permit. It is not permitted for use as a larvicide. Naled may only be used for control of adult in accordance with the permittee's IPM plan.

Mosquitos as Disease Vectors
Mosquitos are disease vectors for illnesses that impact animal and human health. Treatments conducted under this proposed draft permit are expected to reduce mosquitos role in vectoring diseases to other animals. The discussion on human health and disease below is from the Fact Sheet For The Draft Aquatic Mosquito Control NPDES General Permit.

DISEASE TRANSMISSION BY MOSQUITOES(5,6,7,8,9,10,11,12,21,54)
Female mosquitoes of nearly all species require a blood meal (for protein) from vertebrate animals to develop eggs. Several species of mosquito will use humans as blood meal hosts and some of these species can transmit various diseases to humans.

In order for a mosquito to transmit disease to humans, it must first take a blood meal from a host that is carrying a transmittable disease. Most of these hosts are birds and small mammals, making them important to the amplification of diseases in the environment. After taking a blood meal from an infected bird or animal, the mosquito may bite a human, transferring the disease to the human in its saliva. West Nile Virus (WNV) is a good example of this mode of transmission.

Diseases transmitted by mosquitoes and other insects are known as arthropod-borne viruses (arboviral diseases). Globally, the diseases transmitted by mosquitoes to humans include West Nile virus, encephalitides, dengue, yellow fever, malaria, and filariasis. Other pathogens transmitted by mosquitoes include Dirofilaria immitis, a parasitic roundworm and the causative agent of dog heartworm. Some of these diseases have been endemic or epidemic diseases in the United States in the past, but today, the arbovirals usually reported are encephalitides and West Nile Virus. Dengue occurs periodically in this country, mostly in the far South.

PUBLIC HEALTH IMPACTS FROM MOSQUITOES(6,7,8,9,10,12,21)
Currently, only WNV, St. Louis Encephalitis (SLE), and Western Equine Encephalitis (WEE) are known to occur (endemic) in Washington based on DOH comments on the preliminary draft permit. These diseases can cause serious, sometimes fatal neurological ailments in people (the WEE virus also causes disease in horses). WEE infections tend to be more serious in infants while SLE can be more serious for older people. WNV can infect anyone, though immunocompromised people or those over 50 have the highest probability of developing a severe form of the disease. These viruses normally infect birds and small mammals in the environment. During such infections, the level of the virus may increase in these infected animals (amplification) facilitating transmission to humans by mosquitoes.

WNV, a much publicized arboviral disease in Washington and the U.S, was originally found in the northeastern United States in 1999. Approximately 20 percent of the humans infected with WNV will develop West Nile Fever, which has symptoms similar to influenza, and lasts for a few days to several weeks in rare cases. Of those infected with WNV (not West Nile Fever), approximately 0.7% will develop a severe form of WNV neuroinvasive disease. The neuroinvasive form of WNV can be meningitis, encephalitis, meningoencephalitis, or poliomyelitis(10) and can leave lasting neurological effects after recovery. Most humans infected with WNV will never develop symptoms.(10)

Close to 30,000 human cases of West Nile virus have been reported in the U.S. as of the end of 2009. Of those cases, 12,088 were reported as meningitis/encephalitis, 16,765 were West Nile fever, and 771 were unspecified reports. 1161 mortalities due to the neuroinvasive form of WNV have been reported separately.(12)
In Washington, the first reports of WNV occurred in 2006. Since then, 42 human cases of WNV have been reported, three of which were meningitis/encephalitis. One death occurred due to the neuroinvasive form of WNV in 2009.(12) In 2014 a total of 13 human cases of WNV were reported, with two being acquired out of state (http://www.doh.wa.gov/DataandStatisticalReports/DiseasesandChronicConditions/WestNileVirus).

Even if mosquitoes do not transmit disease when they bite mosquito bites can cause other effects such as irritation, redness, itching, pain, secondary infections and allergic reactions. Though Ecology found no statistics for allergies to mosquito bites, an article in the Journal of Allergy and Clinical Immunology by the Joint Council of Allergy Asthma and Immunology lists life threatening stinging insect (bees, wasps, and ants) allergies as affecting 0.4-0.8% of children and 3% of adults.(42,43) An assumption that mosquito allergies occur with similar frequency is possible.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

The Permittee must ensure that the application of larvicides or adulticides does not cause or contribute to further impairment of waters of the state for any parameter for which a water body is listed as impaired.

Permittees must develop a SEPA checklist that is specific to the project. Project level SEPA checklists will identify potential impacts that may result from the application of insecticides to control mosquitos.

Permittees who plan to use adulticides to manage mosquito populations must complete an IPM plan to address planning and controls around the discharge of adulticides. Permittees who only apply larvicides may use the Ecology publication "Best Management Practices for Mosquito Control, May 2004 (publication number 03-10-023) or equivalent in place of developing their own IPM plan. If the Permittee later decides to include adulticides in its mosquito control operations, it must develop an IPM plan prior to using adulticides.

Larvicides
The Permittee may apply larvicides if one or more of the following conditions are met:

a. Pretreatment surveillance of a mosquito breeding sites indicates that at least one larvae/pupae is present in at least one of three dips. In the event that the Permittee finds larvae/pupae, and the area is treated, the Permittee may continue pre-emptive larvicide treatments without dipping for the remainder of the treatment season.
b. Methoprene, Bacillus sphaericus, and Bti based larvicides may be used as a pre-emergent dry-land treatment without dipping in areas that have a historical record of mosquito hatches following flooding.
c. The application site is in, or adjacent to a county in which mosquitoes test positive for disease or bird, animal, or human mosquito-borne disease cases are confirmed during the current treatment season.
d. The treatment site is a catch basin, storm drain, and utility or transportation vault.
e. State or local health authorities declare a public health threat or emergency related to mosquito-borne disease.

The Permittee may not apply temephos or malathion in lakes, streams, in the littoral zone of water bodies, or the sites referenced in special condition S4.B.6. Use of malathion and temephos is only allowed in response to the development of pesticide resistance within a specific larval mosquito population and with the approval of Ecology after consultation with WDFW.

Adulticides

a. Adulticide discharges may only be indirectindirectly enter water.
b. The Permittee must use ultra low volume (ULV) application equipment to apply adulticides if available. If ULV equipment is not available, the Permittee may use other FIFRA label-approved application techniques.
c. The use of malathion and naled as an adulticide shall be done in accordance with the Permittee's IPM plan. These chemicals may not be used in the vulnerable species areas referenced in special condition S4.B.6.

Vulnerable Species

The Permittee must ensure that application of larvicides or adulticides does not cause permanent harm to vulnerable (sensitive, threatened, or endangered) species populations.

WDFW identified specific areas which are known habitat for vulnerable species. These areas are listed in the document titled "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" (areas of concern).

For those areas identified in "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" that are within the Permittee's jurisdiction, the Permittee must develop a plan for the management of mosquitoes within the area of concern in conjunction with WDFW. The plan must be mutually acceptable and agreed to by both the Permittee and WDFW.

The plan must address how mosquitoes will be managed in the area of concern, including timing of application, larvicides and adulticides used, and how impacts to the sensitive, threatened, or endangered species will be minimized or eliminated.

Until the plan is completed and agreed to by both parties, the Permittee is limited to the use of Bacillus sphaericus and Bti based larvicides

The plan agreed to by the Permittee and WDFW must be made available to the Ecology and the public upon request.

WDFW may periodically update the information contained in "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" when new information becomes available.

3. How would the proposal be likely to deplete energy or natural resources?

Ecology does not anticipate discharges conducted under this permit to deplete energy or natural resources. Treatments conducted under this permit may temporarily impose water use restrictions for entities with surface water withdrawal rights, however, the quantity of water available to water rights holders will not be impacted.

Proposed measures to protect or conserve energy and natural resources are:

N/A

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Discharges conducted under this proposed draft permit may occur in areas where sensitive, threatened or endangered species occur. Impacts from treatments could include direct toxic effects or secondary effects on food supply.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Vulnerable Species

The Permittee must ensure that application of larvicides or adulticides does not causeharm to vulnerable (sensitive, threatened, or endangered) species populations, which is a taking under endangered species regulations.

WDFW identified specific areas which are known habitat for vulnerable species. These areas are listed in the document titled "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" (areas of concern).

For those areas identified in "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" that are within the Permittee's jurisdiction, the Permittee must develop a plan for the management of mosquitoes within the area of concern and submit it for review and approval by Ecology. The plan must include letters of concurrence from WDFW and the affected land management agency if one exists.

The plan must address how mosquitoes will be managed in the area of concern, including timing of application, larvicides and adulticides used, and how impacts to the sensitive, threatened, or endangered species will be minimized or eliminated.

Until the plan is completed and approved by Ecology, the Permittee is limited to the use of Bacillus sphaericus and Bti based larvicides

WDFW may periodically update the information contained in "Areas of Restricted Larvicide and Adulticide Use Due to Presence of Vulnerable (Endangered, Threatened, or Sensitive) Species" when new information becomes available.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

During treatments conducted under the proposed draft permit there may be restricted access to the lands and shorelines where application occurs. The duration of the restricted access should be temporary and short lived. After the temporary restriction to land and shoreline use is lifted; land and shoreline use may be enhanced by the management of mosquito populations.

Proposed measures to avoid or reduce shoreline and land use impacts are:

Public Notice

1. The Permittee must publish a public notice on their webpage or in a newspaper with general circulation within the area where larvicide or adulticide application will take place at least ten (10) days before the first pesticide application of the season.

   State agencies with statewide permit coverage (e.g. WSDOT), may publish a public notice in one major newspaper of general circulation for each agency region (e.g. WSDOT Olympic Region, North Central Region, etc.) where the mosquito control activity will take place.

   This notice must include:

   a. The pesticide(s) planned for use and the active ingredient(s).
   b. The approximate date ranges of planned treatments.
   c. The approximate treatment location(s).
   d. The online location where the public may find pesticide application updates (if available online).
   e. The application area posting procedures if the use of larvicides with water-use restrictions is planned.
   f. The name and telephone number of the Permittee and the Ecology Aquatic Pesticides Permit Manager.
   g. The telephone number, email address or web site where a person may contact the Permittee to have their name put on a "No Spray" list.

2. The Permittee's notification to the public regarding mosquito control activities must continue throughout the treatment season if applications occur. After the initial newspaper notice, the Permittee may notify the public using a method other than notices in the newspaper, such as web site postings, mailings, or radio spots.

3. The Permittee must notify wildlife refuges 24 hours in advance of aerial application of adulticides or larvicides over the refuge.

Posting Requirements

1. The Permittee must post notices at all reasonable points of public access to the treatment areas when applying larvicides with water-use restrictions to water bodies used for water supply, fish and shellfish harvesting, swimming, or other water contact activities.
2. The Permittee need not post notices at sites that are not publically accessible (e.g. catch basins, storm drains, utility and transportation vaults, etc).
3. The Permittee must make maps available, to the public, of the adulticide application areas. Maps posted on web pages or available hard copies meet this requirement.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Ecology does not anticipate an increase in demands on transportation or public services. The majority of Permittees that obtained coverage under previous issuances of this permit were public entities conducting mosquito control activities. Treatments conducted under this proposed draft permit may have the ffect of reducing mosquito born illness, which could reduce the burden on public health entities and veterinary health entities.

Proposed measures to reduce or respond to such demand(s) are:

N/A

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

ESA listed and state listed endangered, threatened or sensitive species have the potential to be impacted under this permit. Ecology feels that if Permittees follow the conditions in this permit, the FIFRA label, the Washington Pesticide Control act and the Washington Pesticide Application Act that impacts to ESA listed and State listed species can be avoided.