Permit Fact Sheet

for the General Discharge Permit For Discharges from the Application of Pesticides

Maryland General Permit No. 17-PE, NPDES Permit Number MDG87

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Contents

I. Background 5
1. Clean Water Act 5
2. NPDES Permits 5
3. History of Pesticide Application Regulation 6
4. Court Decisions leading to the CWA regulation concerning Pesticide Applications 6
5. Toxic Substances for Aquatic Life Management in Maryland 7
5.1. Toxic Material Permits (TMPs) under COMAR 26.08.03.02 7
5.2. Incorporation of Toxic Substances Permit Requirements into NPDES Discharge Permit 8
6. Considerations for Threatened or Endangered Species 10
6.1. EPA's ESA Consultation 10
6.2. Provisions in the EPA PGP to address NMFS Listed Resources of Concern 11
6.3. Maryland's Desirable Species Implementation 13
II. Structure of the Pesticides General Permit (17-PE) 15
1. General 15
2. Conformance to Court Decisions 16
3. Sharing of Responsibilities 18
III. Summary of Permit Conditions 19
1. Coverage under the 17-PE 19
1.1. Eligibility 19
1.1.1. Activities Covered 19
1.1.2. Limitations on Coverage 23
1.1.2.1. Discharges to Water Quality Impaired Waters 23
1.1.2.2. Discharges to Waters Designated as Tier 3 for Antidegradation Purposes 27
1.1.2.3. Discharges Covered by another NPDES Permit 28
1.1.2.4. Endangered and Threatened Species 28
1.2. Authorization to Discharge under this Permit 29
1.2.1. How to Obtain Authorization 29
1.2.2. Decision-makers Required to Submit an NOI 36
1.2.3. Discharge Authorization Deadlines 44
1.2.4. Continuation of this Permit 44
1.2.5. Terminating Coverage 44

1.2.5.1. Submitting a Notice of Termination 44
1.2.5.2. When to Submit a Notice of Termination 45
1.2.5.3. Termination for Operators not Required to Submit an NOI 45
1.3. Alternative Permits 45
1.3.1. Requirements for Coverage under an Alternative Permit 45
1.3.2. Operator Requesting Coverage under an Alternative Permit 46
1.4. Severability 46
1.5. Other Federal and State Laws 47
1.6. Federally Listed Endangered and Threatened Species and Designated Critical Habitat. 47
2. Effluent Limitations 47
2.1. Technology-Based Effluent Limitation to ALL Use Patterns (Applicator Responsibility) 51
2.2. Technology-Based Effluent Limitation to Specific Use Patterns (Decision-maker Responsibilities) 53
2.2.1. Mosquito and Other Flying Insect Pests Control 53
2.2.2. Weed and Algae Pest Control 72
2.2.3. Animal Pest Control 76
2.2.4. Forest Canopy Pest Control 80
3. Water Quality-Based Effluent Limitations 83
4. Site Monitoring 96
4.1. Visual Monitoring Requirements for Pesticide Applicators 98
4.2. Visual Monitoring Requirements for all Operators 98
5. Pesticide Discharge Management Plan (PDMP) 98
5.1. Contents of Your PDMP 100
5.2. Pesticide Discharge Management Plan Modifications. 102
5.3. Pesticide Discharge Management Plan Availability. 102
6. Corrective Action 103
6.1. Situations Requiring Revision of Pest Management Measures 103
6.2. Corrective Action Deadlines 104
6.3. Effect of Corrective Action 104
6.4. Adverse Incident Documentation and Reporting 104
6.5. Reportable Spills and Leaks 107
6.6. Documentation for Other Corrective Action 107

7. Recordkeeping and Annual Reporting 107
7.1. Records to be kept by all Operators (all Decision-makers and all Applicators) 108
7.2. Records to be kept by all For-Hire Applicators 108
7.3. Records to be kept by Small Entities, Submitting an NOI 109
7.4. Records to be kept by Large Entities, Submitting an NOI 109
7.5. Retention of Records 110
7.6. Annual Reports 110
7.7. Annual Reporting for Any Decision-maker with Discharges to Waters of this State containing "Desirable Species", as defined in the permit, and who is a Small Entity 111
7.8. Electronic Reporting Requirement 112
8. The Department Contact and Mailing Addresses 113
9. Standard Permit Conditions 113
10. Permit Appendices 113

I. Background

The Maryland Department of the Environment **(**MDE, hereinafter referred to as the "Department") is reissuing the National Pollutant Discharge Elimination System (NPDES) General Discharge Permit For Discharges from the Application of Pesticides (Maryland General Permit No. 17-PE) which authorizes the point source discharges of biological pesticides, and chemical pesticides that leave a residue, to waters of this State.

The Maryland General Permit No. 17-PE replaces the Maryland General Permit No. 11-PE, which expired on October 30, 2016. This Fact Sheet describes the Maryland General Permit No. 17-PE.

Conditions and requirements in the final Maryland General Permit No. 17-PE remain largely unchanged from the Maryland General Permit No. 11-PE, with the exception of incorporation of the conditions of the Toxic Material Permit (TMP), which requires an application under this permit (NOI) rather than a separate application. Supporting information and materials for the Maryland General Permit No. 17-PE are included in appendices to this factsheet.

1. Clean Water Act

Section 301(a) of the Clean Water Act (CWA) provides that "the discharge of any pollutant by any person shall be unlawful" unless the discharge is in compliance with certain other sections of the Act. 33 U.S.C. 1311(a). The CWA defines "discharge of a pollutant" as "(A) any addition of any pollutant to navigable waters from any point source, (B) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft." 33 U.S.C. 1362(12). A "point source" is any "discernible, confined and discrete conveyance" but does not include "agricultural stormwater discharges and return flows from irrigated agriculture." 33 U.S.C. 1362(14). The term "pollutant" includes, among other things, "garbage… chemical wastes, biological materials …and industrial, municipal, and agricultural waste discharged into water."

One way a person may discharge a pollutant without violating the section 301 prohibition is by obtaining authorization to discharge (referred to herein as "coverage") under a section 402 NPDES permit (33 U.S.C. 1342).

2. NPDES Permits

An NPDES permit authorizes the discharge of a pollutant or pollutants into a receiving waterbody under certain conditions. The NPDES program relies on two types of permits: individual and general. An individual permit is a permit specifically tailored for an individual discharger or situations that require individual consideration. Upon receiving the appropriate permit application(s), the Department develops a draft permit for public comment for that particular discharger based on the information contained in the permit application (type of activity, nature of discharge, receiving water quality). Following consideration of public comments, a final permit is then issued to the discharger for a specific time period (not to exceed 5 years) with a provision for reapplying for further permit coverage prior to the expiration date.

In contrast, a general permit covers multiple facilities/sites/activities within a specific category for a specific period of time (not to exceed 5 years). For general permits, the Department develops and issues the permit in advance, with dischargers then generally obtaining coverage under the permit through submission of a Notice of Intent (NOI). A general permit is also subject to public comment prior to issuance.

Under 40 CFR 122.28, general permits may be written to cover categories of point sources having common elements, such as facilities that involve the same or substantially similar types of operations, that discharge the same types of wastes, or that are more appropriately regulated by a general permit. Given the significant number of pesticide operations requiring NPDES permit coverage and the discharges common to these operations, it makes administrative sense to issue the general permit, rather than issuing individual permits to each Operator. The general permit approach allows the Department to allocate resources in a more efficient manner and to provide more timely coverage and may significantly simplify the permitting process for the majority of pesticide dischargers. As with any permit, the CWA requires the general permit to contain technology-based effluent limitations, as well as any more stringent limits when necessary to meet applicable state water quality standards.

3. History of Pesticide Application Regulation

EPA and the Maryland Department of Agriculture (MDA) regulate the sale, distribution and use of pesticides in the United States under the statutory framework of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure that when used in conformance with FIFRA labeling directions, pesticides will not pose unreasonable risks to human health and the environment. All new pesticides, for which registration is required, must undergo a registration procedure under FIFRA during which EPA assesses a variety of potential human health and environmental effects associated with use of the product. Under FIFRA, the effects of pesticides on the environment are considered by determining, among other things, whether a pesticide "will perform its intended function without unreasonable adverse effects on the environment," and whether "when used in accordance with widespread and commonly recognized practice [the pesticide] will not generally cause unreasonable adverse effects on the environment." This analysis allows for the examination of the pesticide ingredients, its intended type of application site and directions for use, and supporting scientific studies for human health and environmental effects and exposures. The applicant for registration of the pesticide must provide specific data from tests done according to EPA guidelines.

When EPA approves a pesticide for a particular use, the Agency imposes restrictions through labeling requirements governing such use. The restrictions are intended to ensure that the pesticide serves an intended purpose and avoids unreasonable adverse effects. It is illegal under section 12(a)(2)(G) of FIFRA to use a registered pesticide in a manner inconsistent with its labeling. States have primary authority under FIFRA to enforce "use" violations, but both the states and EPA have ample authority to prosecute pesticide misuse when it occurs.

4. Court Decisions leading to the CWA regulation concerning Pesticide Applications

In the past, several courts have addressed the question of whether the CWA requires NPDES permits for pesticide applications. These cases resulted in some confusion among the regulated community and other affected citizens about the applicability of the CWA to pesticides applied to waters of the United States.

On November 27, 2006, EPA issued a final rule (hereinafter called the "2006 NPDES Pesticides Rule") clarifying two specific circumstances in which an NPDES permit was not required to apply pesticides to or around water. They were: 1) the application of pesticides directly to water to control pests; and 2) the application of pesticides to control pests that are present over, including near, water where a portion of the pesticides will unavoidably be deposited to the water to target the pests, provided that the application is consistent with relevant FIFRA requirements in both instances. The rule became effective on January 26, 2007.

On January 7, 2009, the Sixth Circuit vacated EPA's 2006 NPDES Pesticides Rule under a plain language reading of the CWA. *National Cotton Council of America v. EPA*, 553 F.3d 927 (6th Cir., 2009). The Court held that the CWA unambiguously includes "biological pesticides" and "chemical pesticides" with residuals within its definition of "pollutant." Specifically, an application of chemical pesticides that leaves no excess portion is not a discharge of a pollutant, and the applicator need not obtain an NPDES permit. However, chemical pesticide residuals are pollutants as applied if they are discharged from a point source for which NPDES permits are required. Biological pesticides, on the other hand, are always considered a pollutant under the CWA regardless of whether the application results in residuals or not and require an NPDES permit for all discharges from a point source.

As a result of the Court's decision to vacate the 2006 NPDES Pesticides Rule, after October 31, 2011 NPDES permits are required for discharges to waters of the United States of biological pesticides, and of chemical pesticides that leave a residue. EPA and all NPDES-authorized states and territories (47 in all) have developed and are implementing NPDES permits for pesticide discharges to cover certain discharges resulting from pesticide applications. EPA Regional offices and state NPDES authorities may issue additional general permits or individual permits if appropriate. EPA issued a general permit referred to as the Pesticides General Permit or PGP. In the PGP, EPA required those who decide (Decision-makers) to use pesticides in or near water, to apply for permit coverage. They included requirements for those who actually apply the pesticides. Maryland followed suite and issued a fundamentally similar permit referred to as the 11-PE.

5. Toxic Substances for Aquatic Life Management in Maryland

In addition to the Federal Regulation regarding pesticides, Maryland regulations under COMAR 26.08.03.02, provide for certain restrictions for "Use of Toxic Substances for Aquatic Life Management Purposes". This part of the Maryland Regulations with records dated back to 1972, predate the 2006 NPDES Pesticides Rule and requires that any person who adds toxic substances to the waters of this State for aquatic life management purposes shall be governed by certain restrictions.

5.1. Toxic Material Permits (TMPs) under COMAR 26.08.03.02

The regulation states that toxic substances may not be applied to, discharged to or deposited in the waters of this State unless the application, discharge, or deposit meets all of the requirements imposed by the regulation and approval is given as a toxic material permit (TMP). The mixing, handling or transfer of toxic substances or the washing of or cleaning operations for toxic substances containers or equipment may not result in any way in application, discharge or deposition in the waters of the State. Wastes and wastewaters from the washing of toxic substance containers or equipment may not be discharged to or permitted to flow into subsurface drainage or disposal systems, municipal sanitary sewerage systems or storm water drainage systems. Lastly the toxic substances used shall be adequately controlled and sufficiently selective so as not to adversely affect desirable species of aquatic life in the designated areas to be treated or any aquatic life outside the designated area to be treated.

Although TMPs have been issued for many years, the last five years of data was selected to provide a representative set of data for evaluation, since most of them were effective for 5 years. Between April 2013 and May 2018, 1752 TMPs were issued by the Department. The Table below provides a summary of these based on type (as described under the PGP) of TMP applied for.

Type of Coverage	Number of Permits	Percentage	Acres	Percentage
Type 1 – Mosquito, Black Fly or Midge*	61	3.4%	106,918.0	84%
Type 2 – Weed, Algae and Pathogen Control	1714	97.9%	17,652.0	16%
Type 3 – Nuisance Animal Control	4	0.002%	2.7	0%
Type 4 – Forest Canopy Pest Control	0	0.0%	0.0	0%
** Some TMPs contain both Type 1 and Type 2.*				

The requirements for Toxic Substances also included permit application requirements and an emergency permit for specific situations. The emergency permit option has not been exercised in the past 5 years, but remains an option.

In February 2018, the Department proposed a change to our regulations that would allow incorporation of toxic material permit requirements into a discharge permit, specifically so that a single applicant would only need to obtain coverage under one permit, rather than having requirements to follow a general discharge permit (such as the 11-PE) and a TMP. "D. A person who discharges toxic substances to waters of the State is not required to obtain a permit under this regulation if the person is covered under a discharge permit issued under COMAR 26.08.01-26.08.04 that incorporates the requirements of subsections (B) and C(1) and (2) of this regulation." This was proposed under the Governor's initiative as a reduction in regulation. In addition to reduction of regulation, this proposed change will ultimately reduce confusion about who is required to have the coverage, how to get coverage, which permit governs actions etc. Ultimately it ensures compliance with the requirements meant to protect waters of this State. The change to regulation became final and effective April 23rd, 2018.

5.2. Incorporation of Toxic Substances Permit Requirements into NPDES Discharge Permit

There were slight differences in the coverage under the toxic substances regulation (TMP) and the PE. The Figure below provides a high level overview of the specific activities permitted under each of these permit schemes. The differences are fairly minor and include applications of toxic materials in tidal waters, the use of non-toxic dyes or colorants and forest canopy pest control (Figure 1). All other activities were covered by both permits. Now that the State's regulation doesn't require separate permits, it is understandable that the new permit approach incorporate all the activities under one permit and application.

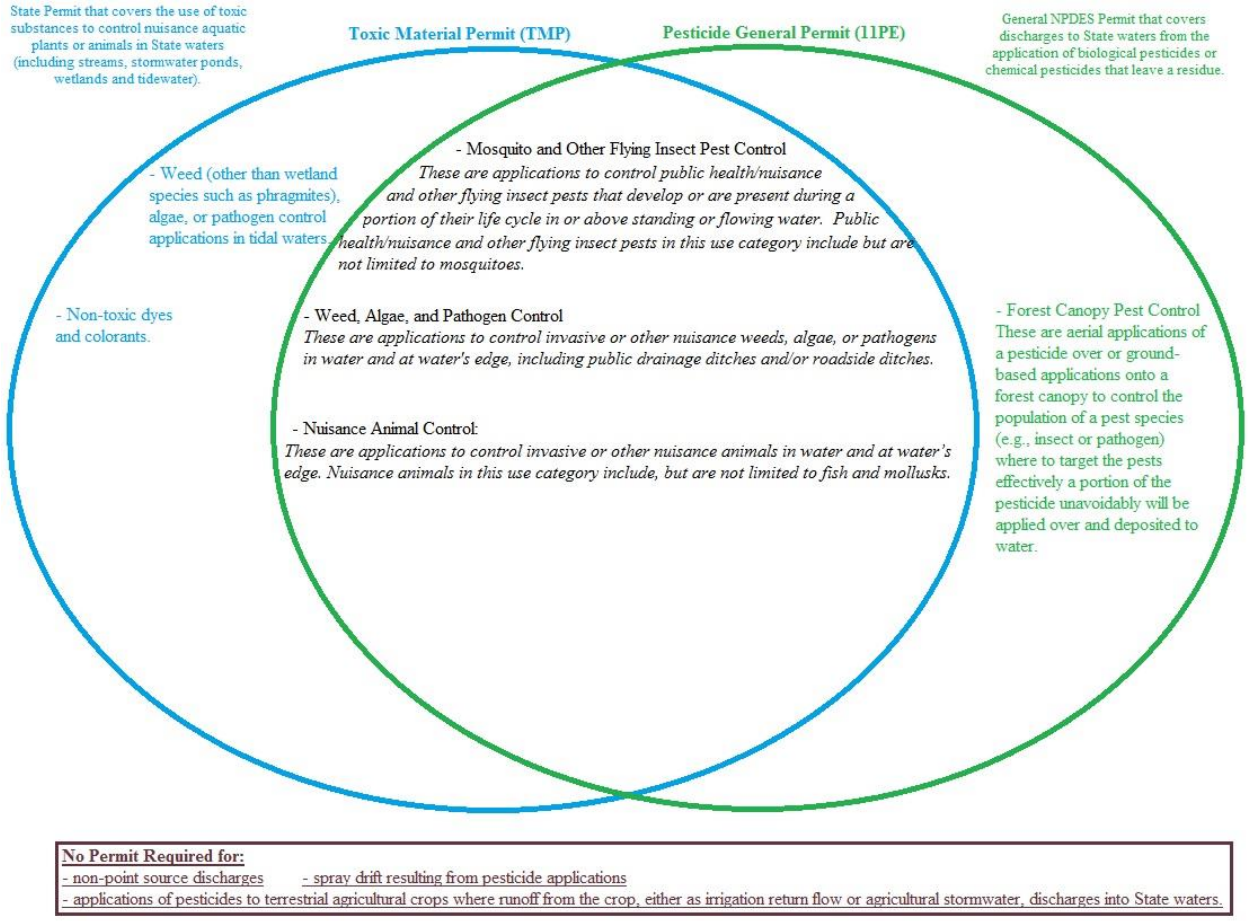


Figure 1 - Comparison of permits for Operators for both TMP coverage and 11PE coverage

Since the Toxic Substances regulation requires an application and issuance of a toxic material permit, incorporation of the coverage under the general permit will still require an application and permit registration. A General Permit Notice of Intent (NOI) and resulting registration letter provides the way to apply for and receive coverage, satisfying the requirement for an application for coverage. An NOI will now be required instead of a TMP application to receive coverage. The specific restrictions and requirements in the TMP will be incorporated into the PE (Figure 2). In this way, an applicator requiring coverage will now effectively obtain a TMP by way of the PE permit and registration letter. The notable exception is where a TMP was not required for the application of pesticides to forest canopy. We will now require an NOI for the activity "Forest Canopy Pest Control" based on the size of the application area. This fact sheet will further evaluate when those activities need to submit an NOI. EPA provided exceptions for certain Operators, which are considered and where appropriate incorporated into the State's general permit to be consistent with EPA PGP approach. It is not the intent of the 17-PE permit to include the entirety of the emergency application requirements (i.e. those would still require the TMP process); however, it will provide for coverage for all other applications of these substances and limited emergency application requirements. The case where a TMP may still be required would be where, in the opinion of the Soil Conservation District (SCD) representative, a situation exists which requires rapid or immediate attention to prevent:

"Development of a situation requiring more extensive treatment at a later date" and where the application of copper sulfate, cutrine or diquat is "restricted to a maximum of two applications". We believe all other situations regarding emergency permit issuance can be effectively handled under the 17-PE.

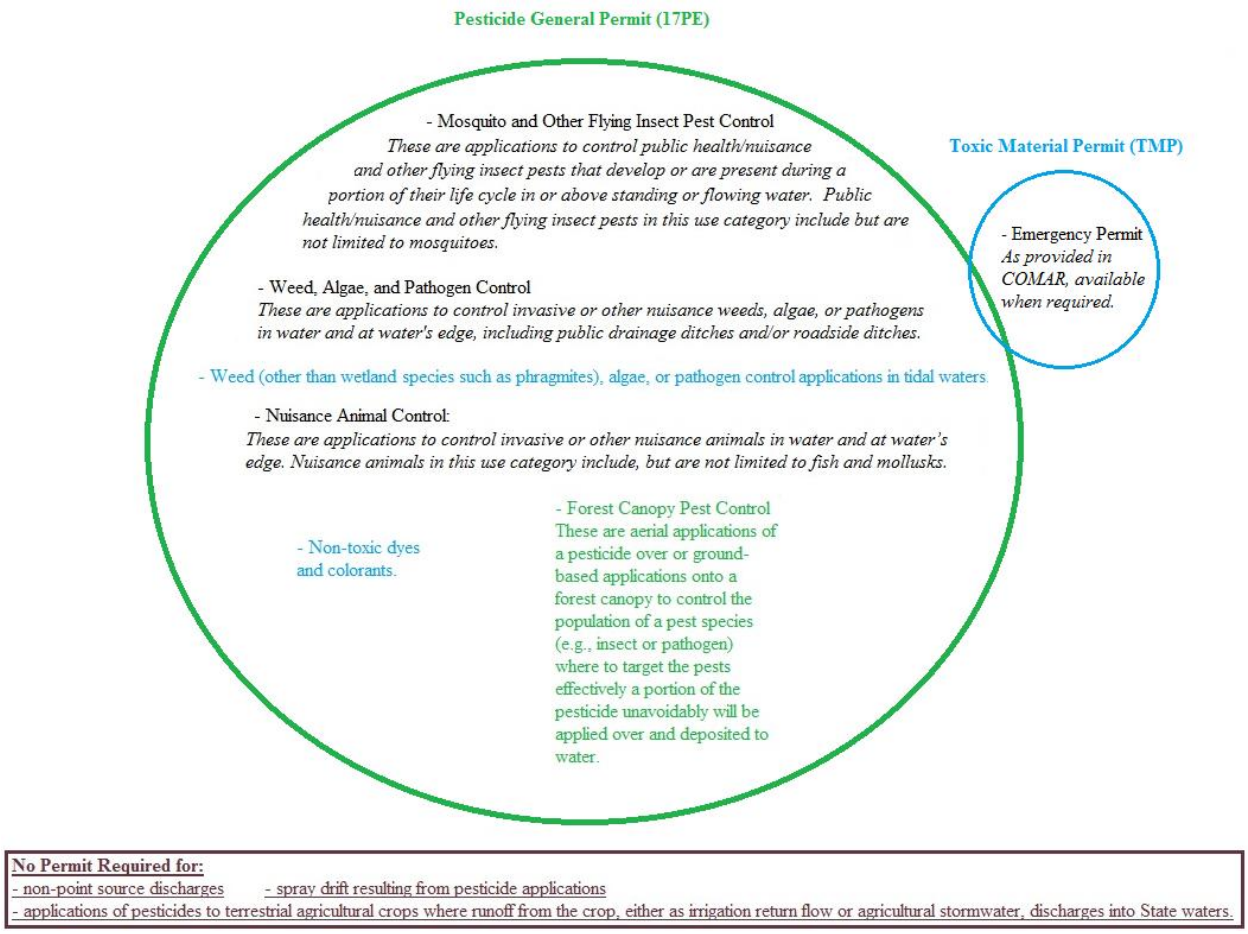


Figure 2 - New grouping of activities under the permit with this renewal.

6. Considerations for Threatened or Endangered Species

Unlike the majority of NPDES permits issued, this permit facilitates the killing or suppression of a species in the permitted area. In EPA's permit, additional protections were put in place for certain species.

6.1. EPA's ESA Consultation

The Endangered Species Act (ESA) of 1973 requires all Federal Agencies to ensure, in consultation with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (together, the "Services"), that any Federal action carried out by the Agency is not likely to jeopardize the continued existence of any endangered species or threatened species (together, "listed" species), or result in the adverse modification or destruction of habitat of such species that is designated by the

Services as critical ("critical habitat"). See 16 U.S.C. 1536(a)(2), 50 CFR 402. When a Federal agency's action "may affect" a protected species, that agency is required to consult with one or both of the Services, depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR 402.14(a)).

To evaluate how the PGP would likely affect listed species and their critical habitat (together, "listed resources"), EPA prepared a Biological Evaluation (BE), which concluded that in some instances the PGP "may affect" listed resources. EPA provided that BE to the Services and the NMFS provided EPA with its final Biological Opinion. The final PGP reflects the provisions that were made following consultation with the NMFS and are designed to ensure that discharges allowed under the PGP are not likely to cause jeopardy to the continued existence of listed species and their critical habitat.

During ESA consultation, NMFS determined that it was appropriate to focus the list of resources of concern on certain species of salmonids, eulachon and sturgeon (the same species which were evaluated in the 2011 Biological Opinion). NMFS also evaluated additional species that have been added to the list of endangered and threatened species since issuance of the 2011 PGP. These additional species include: the Nassau grouper, coral and sea turtle species in coastal areas of Puerto Rico; Atlantic sturgeon in Massachusetts, New Hampshire, and Washington D.C.; Several sea turtle species in coastal areas of Washington, Oregon, California and Massachusetts; and, Bocaccio, Yelloweye Rockfish, and Canary Rockfish in coastal areas of Washington. (See NMFS Biological Opinion at Docket ID No. EPA-HQ-OW-2015-0449). The locations of NMFS Listed Resources of Concern are publicly available at https://www.epa.gov/npdes/pesticide-permitting-ESA-procedures.

6.2. Provisions in the EPA PGP to address NMFS Listed Resources of Concern

EPA estimated that less than 2 % of the total number of Operators in the four states and Puerto Rico in which their PGP applies may need to meet additional permit requirements than they would otherwise have to in order to meet the PGP's ESA related provisions. Such additional permit requirements include submittal of an NOI, implementing Integrated Pest Management (IPM)-like practices, and submitting annual reports. The following discussion summarizes the requirements in the PGP. The permit provisions include eligibility criteria for permit coverage as well as requiring compliance with technology-based effluent limitations and recordkeeping and reporting requirements for Decision-makers with discharges to waters containing NMFS Listed Resources of Concern. Provisions in the PGP are designed to ensure that discharges covered under the permit are not likely to adversely affect NMFS Listed Resources of Concern, except as provided in Criterion B, C, and, for 60 days, D, of the permit. EPA's PGP requires anyone seeking permit coverage to determine if their pesticide discharges would be to waters containing NMFS Listed Resources of Concern, as defined in the PGP Appendix A. Also the PGP Appendix I contains a four-step process that must be followed for determining whether an Operator is eligible for permit coverage, prior to submittal of the NOI.

Any Decision-maker who discharges to waters containing NMFS Listed Resources of Concern under the PGP is required to:

a. Submit a Notice of Intent (NOI) for coverage under the PGP;

b. Implement pest management measures to meet the technology-based effluent limitations that are based on IPM principles except those Decision-makers that will need to submit an NOI only because they discharge to waters containing NMFS Listed Resources of Concern; and
c. Submit annual reports.

NOIs for point source discharges to waters containing NMFS Listed Resources of Concern are due at least 30 days prior to commencement of discharge except where pesticide applications are being made in response to a Declared Pest Emergency Situation. For those Declared Pest Emergency Situations, NOIs are due no later than 15 days after beginning discharge. A Declared Pest Emergency Situations as identified in Appendix A of the permit, means an event defined by a public declaration by a federal agency, state, or local government of a pest problem determined to require control through application of a pesticide beginning less than ten days after identification of the need for pest control. This public declaration may be based on: 1.Significant risk to human health; 2. Significant economic loss; or 3. Significant risk to: a.Endangered species, b.Threatened species, c.Beneficial organisms, or d.the environment. Declared Pest Emergency Situations are eligible for permit coverage for a period of at least 60 days after beginning to discharge. Operators may continue to discharge after 60 days in these situations unless EPA notifies them that the discharge raises concern related to NMFS Listed Resources of Concern, in which case EPA will either direct that the discharge cease within the 60 day timeframe, or specify additional conditions to protected NMFS Listed Resources of Concern.

Decision-makers can contact EPA or NMFS in advance of NOI submission to assess permit coverage eligibility for planned discharges containing NMFS Listed Resources of Concern. EPA expects this advance contact will help Decision-makers determine if planned pesticide applications are or are not likely to cause adverse effects to listed species and if so, to identify steps that should be taken to ensure that such adverse effects do not occur.

NOIs submitted for any point source discharge to waters containing NMFS Listed Resources of Concern (except for those applications where: (1) consultation under ESA Section 7 has occurred already; (2) one of the Services issued a permit for “take” under ESA Section 10 action; (3) or the Decision-maker has written correspondence from NMFS that pesticide application activities performed consistent with appropriate measures will avoid or eliminate the likelihood of adverse effects) must include the following information:

1. Description of the location of the pest management area in detail or a map of the location;
2. Pest(s) to be controlled;
3. Pesticide product(s) to be discharged and method of application;
4. Planned quantity and rate of discharge(s) for each method of application;
5. Number of planned discharges;
6. Approximate date(s) of planned discharge(s);
7. Rational supporting the determination whether the discharge is likely to adversely affect a NMFS Listed Resource of Concern, including a description of appropriate measures to be undertaken to avoid or eliminate the likelihood of adverse effects; and
8. Signed certification by the Decision-maker consistent with the six criteria (A-F) in their permit, which reference different reviews based on the situation (emergency, consultation etc).

In the event an NOI is submitted for a Declared Pest Emergency Situation, the NOI must include information contained in items 1 through 7 listed above. Decision-makers must also include equivalent information in items 1 thorough 6, listed above, for those discharges that have already occurred for an NOI filed 15 days after beginning to discharge.

EPA recognizes that implementation of pest management measures as specified in the permit may involve a degree of "adaptive management" such that exact timing and quantities of applications cannot be determined in advance for the duration of the permit. EPA expects the Decision-maker to provide the required information to the extent feasible and consistent with the implementation of the selected pest management measures.

EPA will notify NMFS immediately upon submission of any NOI that identifies discharges to waters of the United States containing NMFS Listed Resources of Concern. NMFS will have 30 days from the NOI submission date to provide EPA with a determination as to whether it believes the eligibility criterion of "not like to adversely affect listed species or designated critical habitat," has been met, could be met with conditions that NMFS specifies, or has not been met. EPA expects to rely on NMFS' expertise with regard to NMFS Listed Resources of Concern when considering whether the prospective discharges would have any adverse effects on NMFS Listed Resources of Concern, and whether to withhold authorization. If NMFS does not provide EPA with this information within 30 days of EPA posting on the Internet receipt of a complete and accurate NOI, the discharges will be authorized 30 days after EPA posts on the Internet receipt of a complete NOI. EPA could, after receiving NMFS' determination (or other issues raised by other parties) decide to place the NOI on hold (i.e., delay authorization to discharge) if necessary. EPA may authorize certain discharges in less than 30 days, but no fewer than 10 days, for any discharges under Criterion B, C, or E of PGP Part 1.1.2.4 of the permit (for which NMFS has already evaluated the effects of these discharges).

Annual reports submitted by the Decision-makers for these point source discharges to waters of the United States containing NMFS Listed Resources of Concern will include the information outlined below. EPA will collect and summarize these annual reports and provide such information to NMFS on an annual basis.

a. A description of treatment area, including location and size,
b. The approximate date of any discharge,
c. Identification of any waters of the United States to which pesticide pollutants are discharged,
d. The pesticide use pattern resulting in any discharge,
e. Any target pest(s),
f. Contact information for the Decision-maker or any pesticide applicator,
g. The total amount of each pesticide product applied for the reporting year by the application method,
h. If applicable, an annual report of any adverse incidents as a result of any discharge, and
i. If applicable, a description of any corrective action.

6.3.Maryland's Desirable Species Implementation

Maryland considers the EPA PGP requirements for ESA species as a valuable backdrop for consideration in our permit (i.e. NMFS designation of Atlantic sturgeon in the Potomac). The

regulated protections in Maryland's TMP implementation (the existing permit discussed above I.5 "Toxic Substances for Aquatic Life Management in Maryland") require additional controls which are sufficiently selective so as not to adversely affect "desirable species of aquatic life" in or outside the designated area to be treated. Desirable species are not defined in regulation, however have now bee defined in the permit to be consistent with the previous years of implementation of the TMP. "Desirable Species" include "threatened or endangered species, species in need of conservation, species of management concern, and critical habitat". Since there was no official definition, the desirable species definition in this permit could have included other organisms that live in the same area where the pesticide will be applied. However the 11-PE, the PGP and the 17-PE permits address "Non-target Organisms" separately with a separate definition and control requirements. Thus, these were not included in the narrow definition for this permit.

The Department of Natural Resources (DNR) is the Maryland authority responsible for Threatened and Endangered Species protections under COMAR 08.03.08.00. DNR deals with the taking, transport, or other practice that impacts species identified under that regulation. They have been central in evaluation of potential impacts on communities of "desirable species" when issuing permits for use of pesticides for aquatic use in Maryland.

State law requires that all State agencies conserve and protect these species. The Environmental Review system is the primary method used to ensure that actions authorized, funded, or carried out by other State agencies do not jeopardize the continued existence of listed species. Through this system, the Wildlife and Heritage Service (within DNR) reviews hundreds of projects each year to identify potential impacts to known locations of rare, threatened, or endangered species and their habitats. When potential impacts are identified, Regional Ecologists work with the applicant to avoid or minimize disturbance.

DNR's Environmental Reviews for the MDE issued permits encompass four broad programs.

1) Maryland Natural Heritage Program (MD NHP). The MD NHP has been the lead state agency responsible for protecting and managing nongame, rare, threatened, and endangered species and their habitats in Maryland. The main duties of the Program biologists are to:
   - Perform field surveys and scientific research
   - Maintain data needed to conserve species and habitats
   - Provide technical guidance on rare species conservation
   - Restore ecosystems

2) Sensitive Species Project Review Areas (SSPRA). The SSPRA are managed by the MD NHP. The Program creates maps that indicate areas that contain one or more threatened or endangered species or wildlife species in need of conservation. The SSPRA are dynamic and may change yearly, based on information from the MD NHP.

3) Fishing and Boating Services additionally review game fish species on both the threatened and endangered species list (e.g. federally listed populations of Atlantic Sturgeon), as well as the Fishery Management Plan or species of management concern (i.e. Brook trout, a salmonid considered by the Services as potentially sensitive to pesticide applications). Natural populations of trout are protected in streams designated as Use III.

4) Environmental Review Program (DNR ERP) . Regarding work with MDE permitting, the DNR ERP program serves to review and screen when there may be potential MD NHP issues. They work with both the MD NHP and Fishing and Boating Services.

These program reviews will be built into the 17-PE, and the components of PGP Appendix I (the four-step process) that must be followed for determining whether an Operator is eligible for permit coverage, prior to submittal of the NOI, will be incorporated into the 17-PE.

II. Structure of the Pesticides General Permit (17-PE)

1. General

EPA's PGP was written for the many specific areas of the country for which EPA remains the NPDES permitting authority. States that are authorized to issue NPDES permits will continue to administer their own NPDES permits to cover such discharges. Nothing in the federal regulations precludes a state from adopting or enforcing requirements in their own permits that are appropriate to address discharges in their state or are more stringent or more extensive than those required by EPA under the NPDES regulations. See CWA section 510. In fact, the CWA is meant to serve as a baseline for state environmental protection. The CWA and corresponding NPDES regulations require that permits, at a minimum, include the requirements detailed in 40 CFR 122.44 (but not necessarily in the same way as in this permit). States are free to incorporate additional or different requirements that they feel are appropriate to protect water quality. Similarly, how EPA and states interpret information from which permit requirements are developed may differ. As an example, Maryland is incorporating long standing requirements for application of toxic substances, as discussed in previous background section. This does differ from EPA's PGP. As described above, the state had regulations requiring these practices prior to the PGP, and they continue to be justified to protect water quality.

The permit is divided into these parts:

1. Permit Applicability,
2. Authorization under the Permit,
3. Special Conditions,
    a. Technology-based effluent limitations,
    b. Water quality-based effluent limitations,
    c. Monitoring,
    d. Pesticide discharge management plan,
    e. Corrective action,
    f. Recordkeeping and annual reporting, and
    g. Electronic reporting
4. Appendices with additional guidance for permittees:
    a. Definitions, Abbreviations, and Acronyms,
    b. Pesticide Discharge Evaluation Worksheet.
    c. Adverse Incident Template,
    d. Annual Report Template, and
    e. Desirable Species Procedures.

Operators should carefully read each part of the permit to assess whether or what portion of the

requirements in each part may apply to their activities. As will be discussed in more detail, the permit establishes different requirements for different types of pesticide use patterns, different types of Operators, and different sizes of areas treated and managed for the control of pests. The organization of the permit is intended to clarify the applicable requirements for Operators to the greatest extent possible.

2. Conformance to Court Decisions

Similar to the Maryland General Permit No. 11-PE, the Department has structured the Maryland General Permit No. 17-PE to conform to relevant court decisions. In this permit, the Department explicitly establishes effluent limitations in Parts III.A and III.B that are independent of any documentation and recordkeeping requirements regarding implementation of the limitations. In a separate part of the permit (Part III.D) there is a requirement to develop a Pesticide Discharge Management Plan (PDMP). The PDMP is not a limitation and does not itself impose requirements on discharges. These are already imposed by the limitations in Parts III.A and III.B. The PDMP is rather a tool for those Operators to document, among other things, how Pest Management Measures will be implemented to comply with the permit's effluent limitations.

Effluent Limitations in the Maryland General Permit No. 17-PE

This permit includes technology-based and water quality-based effluent limitations, defined in the CWA as restrictions on quantities, rates, and concentrations of constituents that are discharged. These effluent limitations can be narrative rather than numeric. Violation of any of these effluent limitations constitutes a violation of the permit.

The TMP regulations provide specific technology-based restrictions, which were not in the 11-PE. These are added into the 17-PE technology and water quality based limitations. These include protection for waters protected for use for drinking water and the use of a licensed applicator. The other technology-based effluent limitations, which were in the previous 11-PE permit, require the Operator to minimize the discharge of pesticides to State waters from the application of pesticides. Consistent with the control level requirements of the CWA, the term "minimize" means to reduce and/or eliminate pesticide discharges to State waters through the use of Pest Management Measures to the extent technologically available and economically achievable and practicable for the category or class of point sources covered under the permit, taking into account any unique factors relating to the Operators to be covered under the permit. The technology-based effluent limitations section is divided into two parts. The first part applies to all Applicators and addresses the general requirement to minimize discharges from application of pesticides. In this part, all Applicators must minimize discharges of pesticides by using only the amount of pesticide product per application and frequency of pesticide applications necessary to control the target pest, performing regular maintenance activities, calibrating and cleaning/repairing application equipment, and assessing weather conditions in the treatment area. The second part requires certain Operators (now referred to as the Decision-makers) to implement pest management measures that involve identifying the pest problem, assessing the pest management, and following specified procedures for pesticide application.

In addition, Operators must control any discharge as necessary to meet applicable water quality standards. Any discharge that results in an excursion of any applicable numeric or narrative water quality standard is prohibited. In general, based on the data included in the record and the additional requirements in the permit, in addition to FIFRA's requirements and the data and information upon which FIFRA registrations are based, the Department expects that compliance with the technology-based effluent limitations and other terms and conditions in the permit will meet applicable water quality-based effluent limitations. The Department has no evidence, based on the State ongoing assessments, that the existing controls in the 11-PE and the TMPs issued caused water quality problems.

However, if the Operator or the Department determines that the discharge causes or contributes to an excursion of applicable water quality standards, the Operator must take corrective actions as required in the permit and document and report the excursion(s) to the Department. Furthermore, the Department may impose additional water quality-based limitations on a site-specific basis, or require an Operator to obtain coverage under an individual permit, if there is reasonable potential that, after meeting the technology-based limitations in the permit, the discharge is not controlled as necessary to meet applicable water quality standards. The Department also notes that among the eligibility requirements for coverage under the permit are requirements that the permit does not cover discharges of any pesticide into a water impaired by a substance which either is an active ingredient in that pesticide or is a degradate of such an active ingredient, or into a Tier 3 water (except for pesticide applications made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis). While not specifically framed as effluent limitations, these eligibility conditions further help to protect water quality on a water-body-specific basis.

Pesticide Discharge Management Plan (PDMP)

Distinct from the technology-based or water quality-based effluent limitation, the permit requires Operators that exceed a treatment area threshold and/or large entities to prepare a PDMP to document the implementation of Pest Management Measures being used to comply with the effluent limitations. A large entity, as defined in Appendix A of the permit, is (1) a public entity that serves a population greater than 10,000 people or (2) a private enterprise that exceeds the Small Business Administration "size standards" as provided in 13 CFR 121.201.

In general, the permit requires that the following be documented in the PDMP:

1. Pesticide discharge management team information;
2. Problem identification;
3. Pest management options evaluation;
4. Response procedures pertaining to spills and adverse incidents;
5. Documentation to support eligibility considerations under other federal laws, and
6. Signature requirements.

The PDMP must be kept up-to-date and modified whenever necessary to document any corrective actions as necessary to meet the effluent limitations in this permit.

The requirement to prepare a PDMP is not an effluent limitation because it does not restrict quantities, rates, and concentrations of constituents that are discharged. Instead, the requirement to develop a PDMP is a permit "term or condition" authorized under sections 402(a)(2) and 308 of the Act. Section 402(a)(2) states, "[t]he Administrator shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate." The PDMP requirements set forth in the permit are terms or conditions under the CWA because the Operator is documenting information on how it is complying with the effluent limitations (and inspection and evaluation requirements) contained elsewhere in the permit. Thus, the requirement to develop a PDMP and keep it updated is no different than other information collection conditions, as authorized by section 402(a)(2), in other permits. Failure to have a PDMP, where required, is a violation of the permit.

While the permit requires Operators to select Pest Management Measures to meet the effluent limitations in the permit, the Pest Management Measures themselves are not effluent limitations because the permit does not impose the obligation to comply with the PDMP; rather, the permit imposes the obligation to meet the effluent limitations prescribed in the permit. Therefore, Operators are free to change as appropriate the Pest Management Measures used to meet the effluent limitations contained in the permit.

This flexibility helps ensure that Operators are able to adjust their practices as necessary to ensure continued compliance with the permit's effluent limitations. However, the permit also contains a recordkeeping condition that requires that the PDMP be updated with any such changes. Thus, if an Operator's on-the-ground practices differ from what is in the PDMP, this would constitute a violation of the permit's recordkeeping requirement to keep the PDMP up-to-date, and not per se a violation of the permit's effluent limitations, which are distinct from the PDMP. The Department recognizes, however, that because the PDMP documents how Operators are meeting the effluent limitations contained in the permit, not following through with actions identified in the PDMP as the method of complying with the effluent limitations in the permit is relevant to evaluating whether Operators are complying with the permit's effluent limitations.

Public Availability of Documents

The permit requires that Operators retain an up-to-date copy of the PDMP at the address listed on the NOI and it must be immediately available, at the time of an onsite inspection or upon request from the Department, Maryland Department of Agriculture, EPA, representatives of the United States Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS). While not required to be submitted to Department, interested persons can request a copy of the PDMP through the Department, at which point Department will likely request the Operator to provide a copy of the PDMP. By requiring members of the public to request a copy of the PDMP through the Department, the MDE is able to provide the Operators with assurance that any Confidential Business Information that may be contained within its PDMP is not released to the public. NOIs will be publicly available once submitted.

3. Sharing of Responsibilities

This general permit was developed with the understanding that there may be more than one responsible entity for a given discharge. As structured, the permit provides for sharing of responsibilities to meet the end goal of discharges being in compliance with permit requirements. The NPDES regulations state that "Operators" are responsible for achieving permit compliance. Specifically, 40 CFR 122.21(b) clarifies that when an activity is owned by one person but it is operated by another person (e.g. contractor), it is the Operator's duty to meet terms of the permit. We acknowledge, however, that in many instances the owner may still perform Operator duties; as such, they may still be required to obtain permit coverage, even in situations in which, for example, the owner hires a contractor to apply the pesticides to control pests. The permit includes a definition of "Operator" that is intended to clarify this point, focusing on the fact that Operator control exists both at the "Decision-maker" level about how to control pests, including financial considerations, as well as at the pesticide Applicator" level (such as calibration of pesticide application equipment). In these instances, both Operators, i.e., the Decision-maker and the Applicator, are required to obtain NPDES permit coverage; however, the permit strives to minimize any potential duplication of effort by identifying which Operator is responsible for certain permit conditions.

The Department had not delineated responsibilities between Decision-makers and Applicators in the previous permit, other than the Decision-maker must sign the Pesticides Management Plan. The TMP process was very specific to an applicator. However many of the decisions and controls for the 11-PE lay in the hands of Decision-makers. Since the permit and TMP were separate requirements, the distinction was confusing. The new 17-PE permit clarifies these responsibilities by identifying whether the Department expects these activities to be performed by all Operators, or just the Decision-maker or the Applicator.

However, the Department recognizes that, in some instances, entities may not be Operators if, for example, they own the land, but the activities are being performed outside of their control (e.g., a public entity is spraying for mosquitoes over private property, or a private party is spraying for weeds on public

lands leased from the government).

The Department encourages Operators to use already prepared information and explore possible cost savings by sharing responsibilities for implementing aspects of this permit. For example, a mosquito control district may have developed something for their FIFRA program and they could assume the overall coordination of an integrated pest management program while a hired contractor may be responsible for minimizing the pesticide discharge and for site monitoring and maintaining and calibrating pesticide application equipment. In instances where multiple Operators are responsible for the discharge from larger pesticide application activities, some form of written explanation of the division of responsibilities should be documented. However, any and all Operators covered under the permit are still responsible, jointly and severally, for any violation that may occur, though the Department may consider this written division of responsibilities when determining the appropriate enforcement response to a violation. The permit's section on "Duty to Comply" makes it clear all parties involved in a pesticide application event are responsible.

III. Summary of Permit Conditions

1. Coverage under the 17-PE

1.1. Eligibility

1.1.1. Activities Covered

The activities covered under the Maryland General Permit No. 17-PE now include all activities covered by the TMP, a departure from the previous separation under the Maryland General Permit No. 11-PE and toxic substances permits. This change is reflected in the activities covered section of the permit. Only Operators meeting the outlined eligibility requirements may be covered under the permit. If an Operator does not meet the eligibility provisions described in the permit, the Operator's point source discharges to State waters from the application of pesticides will be in violation of the CWA, unless the Operator has obtained coverage under another permit or the CWA otherwise exempts these discharges from NPDES permit requirements.

The activities covered by this permit generally include the use patterns and types of pest control activities described in the vacated 2006 NPDES Pesticides Rule, with the addition of non-toxic dyes and colorants which were under the TMP previously. Under CWA section 502(14), agricultural stormwater and irrigation return flow are exempt from NPDES permits. Also, applications that do not reach State waters do not need permit coverage.

Thus, the Maryland General Permit No. 17-PE covers the discharge of pesticides (biological pesticides and chemical pesticides which leave a residue) to State waters resulting from the following use patterns:

1. Mosquito and Other Flying Insect Pest Control;
2. Weed and Algae Control;
3. Animal Pest Control; and
4. Forest Canopy Pest Control.

<u>Mosquito and Other Flying Insect Pest Control:</u>

This use pattern includes the application, by any means, of chemical and biological insecticides and larvicides into or over water to control insects that breed or live in, over, or near State waters. Applications of this nature usually involve the use of ultra-low volume sprays or granular larvicides

discharged over large swaths of mosquito breeding habitat and often are performed several times per year.

Weed and Algae Pest Control:

This use pattern includes the application, by any means, of contact or systemic herbicides to control vegetation and algae (and plant pathogens such as fungi) in State waters and at water's edge, including ditches and/or canals. Applications of this nature typically are single spot pesticide applications to control infestations or staged large scale pesticide applications intended to control pests in several acres of waterway. Pesticide applications in a treatment area may be performed one or more times per year to control the pest problem.

Although not limited by FIFRA or controlled by MDA, use of colored dyes for algae suppression does have restrictions in the permit. Maryland State Regulations identify color impacts to surface waters as pollution. COMAR 26.08.02.03-B(2)(c), waters of the state are not to be polluted by any material which would "change the existing color to produce an objectionable color for aesthetic purposes." While dyes don't hurt fish or other aquatic animals, they can affect desirable submerged plants that fish and other aquatic life may use for food and habitat. The permit addresses discharges and how color must be controlled. If it cannot be controlled it isn't covered by the permit.

Animal Pest Control:

This use pattern includes the application, by any means, of pesticides into State waters to control a range of animal pests for purposes such as fisheries management, invasive species eradication, or equipment operation and maintenance. Applications of this nature are often made over an entire or large portion of a waterbody as typically the target pests are mobile. Multiple pesticide applications to a waterbody for animal pest control are often made several years apart.

Forest Canopy Pest Control:

This use pattern includes pest control projects in, over, or to forest canopies (aerially or from the ground) to control pests in the forest canopy where State waters exist below the canopy. Applications of this nature usually occur over large tracts of land, and are typically made in response to specific pest outbreaks. The Department understands that for this use pattern pesticides will be unavoidably discharged into State waters in the course of controlling pests over a forest canopy as a result of pesticide application. These pests are not necessarily aquatic (*e.g.*, airborne non-aquatic insects) but are detrimental to industry, the environment, and public health. Note: the Department recognizes that mosquito adulticides are applied to forest canopies, and this application is covered under the "Mosquito and Other Flying Insect Pest Control" use pattern.

Consistent with the 2006 NPDES Pesticides Rule, this permit does not cover either "spray drift" – the airborne movement of pesticide sprays away from the target application site into State waters – or applications of pesticides to terrestrial agricultural crops where runoff from the crop, either as irrigation return flow or from stormwater, discharges into State waters.

The Department acknowledges that the EPA is actively engaged in several initiatives to help minimize pesticide drift problems, such as:

(1) Establishing a new voluntary Pesticide Drift Reduction Technology (DRT) program;
(2) Evaluating potential for drift as a routine part of pesticides risk assessments;
(3) In collaboration with experts, improving scientific models and methods for estimating drift and risks from drift;

(4) Strengthening labeling for new pesticides and when re-evaluating older pesticides; (improving the clarity and enforceability of product label directions and drift management restrictions; and
(5) Promoting applicator education and training programs. More information on EPA's work on reducing pesticide drift is available at https://www.epa.gov/reducing-pesticide-drift.

Irrigation return flow (such as runoff from a crop field due to irrigation of that field) and agricultural stormwater runoff do not require NPDES permits, as exempted from the definition of point source under Section 502(14) of the CWA. This is true whether the discharge contains pesticides or pesticide residues resulting from the application of pesticides. In particular, non-agricultural stormwater that may contain pesticides would not be eligible for coverage under the permit, and is not required to obtain NPDES permit coverage unless otherwise required under section 402(p) of the Clean Water Act. Existing stormwater permits for construction, industrial activity, and regulated municipal separate storm sewer systems (MS4s) already address pesticides in stormwater from those sources. Thus, stormwater is either: (a) already subject to NPDES permit requirements pursuant to section 402(p) of the CWA or (b) is a discharge for which NPDES permit coverage is not currently required under section 402(p). The regulations that specify what types of stormwater require NPDES permits can be found in 40 CFR §122.26 and 122.30-122.37.

The Department determined that the four use patterns included in the permit would encompass the majority of pesticide applications that would result in point source discharges to State waters and generally represent the use patterns intended to be addressed by the 2006 rule that is now vacated. This permit does not cover, nor is permit coverage required, for pesticides applications that do not result in a point source discharge to State waters, such as for the purpose of controlling pests on agricultural crops, forest floors, or range lands. However, the application of herbicides in State waters and the control of pests on plants grown in State waters, such as perennial obligate hydrophytes, is within the scope of coverage of this permit. This fact sheet does not identify every activity which may involve a point source discharge of pesticides to State waters that would require a permit; rather, the fact sheet focuses on the activities for which coverage under the permit is available. The existence of this general permit does not alter the requirement that discharges of pesticides to State waters that are not covered by this permit be covered by an individual permit or another general permit.

Scope of Permit

The Sixth Circuit Court of Appeals found that if a chemical pesticide leaves any excess or residue after performing its intended purpose, such excess or residue would be considered a pollutant under the CWA. The Court also found that, unlike chemical pesticides, not only would the residue and excess quantities of a biological pesticide be considered a pollutant, but so too would the biological pesticide itself under the CWA.

Although the court did not define what a residual is, for purposes of this permit, the Department adopts EPA's definition and assumes that most if not all chemical pesticides will leave a residual once the product has performed its intended purpose, unless the Operator can show otherwise.

The Department offers the following guidance with respect to the use patterns of chemical pesticides covered by this general permit.

1. If the application of a chemical pesticide is made <u>over</u> State waters to control pests <u>over</u> the water, any amount of the pesticide that falls into State waters is "excess" pesticide and would require coverage by an NPDES permit.

   The Department expects that some portion of every application of a pesticide made over State waters will fall directly into such waters and thus assumes that applications will trigger the

requirement for an NPDES permit. A permit is not necessary if no portion of a chemical pesticide applied over State waters will fall into those waters.

Important definition: “"Waters of this State" includes:

> (a) Both surface and underground waters within the boundaries of this State subject to its jurisdiction, including that part of the Atlantic Ocean within the boundaries of this State, the Chesapeake Bay and its tributaries, and all ponds, lake, rivers, streams, tidal and nontidal wetlands, public ditches, tax ditches, and public drainage systems within this State, other those designed and used to collect, convey, or dispose of sanitary sewage;
>
> (b) The flood plain of free-flowing waters determined by the Department of Natural Resources on the basis of the 100-year flood frequency.”

2. If the application of a chemical pesticide is made <u>into</u> State waters to control a pest in such waters, once the pesticide no longer provides any pesticidal benefit, any amount of the pesticide that remains in those waters is a “residual” and would require coverage by an NPDES permit. Additionally, as the Sixth Circuit reasoned, the residual is discharged at the time of a pesticides initial application.

   The Department expects that some portion of every application of a pesticide made into State waters will leave a residual in those waters and thus assumes every application will trigger the requirement for an NPDES permit. The Department expects that an entity applying pesticides with a discharge to State waters who wishes to dispute this assumption would be expected to provide scientific data supporting such a determination. Such data should show what level of the pesticide can be detected in water, and at what level in water the pesticide provides a pesticidal benefit. Such data should address the properties of the chemical pesticide under different water conditions (*e.g.*, different pH, organic content, temperature, depth, etc.) that might affect the pesticide’s properties. A permit would not be necessary if it is determined that a residual did not enter State waters.

3. This permit authorizes discharges associated with four categories of pesticide application activities: mosquito and other flying insect pest control, weed and algae pest control, animal pest control, forest canopy pest control. As noted above, only point source discharges of pollutants to State waters require a permit, and it is beyond the scope of this factsheet to identify all specific activities that do or do not require a permit. However, to the extent that activities that fall within the four covered categories require a permit, they can be authorized by this general permit if all eligibility requirements are met.

   For example, discharges to control pests in or near areas that are State waters, even when these areas are dry for much of the year, may be covered by this permit, if one is required.

   For two of the categories, weed and algae pest control and animal pest control, the permit specifies that covered activities include applications to control pests “in water and at water’s edge.” The Department intends for the phrase “at water’s edge” to allow coverage of activities targeting pests that are not necessarily “in” the water but are near the water such that control of the pests may unavoidably involve a point-source discharge of pesticides to State waters.

   The category forest canopy pest control is for applications to a forest canopy. The Department intends that this can include both mature and immature forest canopies, including canopies that may not be continuously connected, where control of pests

associated with the canopy (*i.e.*, branches and leaves of the trees) may unavoidably involve point source discharges of pesticides to State waters.

For purposes of this permit, the Department is relying on existing regulatory definitions in 40 CFR 174.3 and 158.2100(a) developed under FIFRA to define the term "biological pesticides." For purposes of this permit, the Department identifies biological pesticides (also called "biopesticides" under FIFRA regulations) to include microbial pesticides [40 CFR 158.2100(b)], biochemical pesticides [40 CFR 158.2000(a)(1)] and plant-incorporated protectants. [40 CFR 174.3] The Department also includes dyes or colorants meant to control algae by reducing light penetration, but have unintended consequence of causing waters of this State to have a color, considered a pollutant in state regulations 26.08.02.03(A)(2) "Any material, including floating debris, oil, grease, scum, sludge, and other floating materials attributable to sewage, industrial waste, or other waste in amounts sufficient to:" "(c) Change the existing color to produce objectionable color for aesthetic purposes;"

The Department recognizes that there are many site-specific situations which will determine whether a pesticide application operation needs permit coverage. The Department is not attempting to define all such situations in this Fact Sheet. Additionally, any pesticide application activities that do not fall within the four use patterns covered by this permit will require coverage under some other NPDES permit if those activities result in point source discharges to waters of this State. However, the Agency does want to make it clear that to the extent pesticide application operations need permit coverage, this permit is available for the four pesticide use categories. Thus, to the extent that a permit is needed for discharges from pesticide applications to rangelands, forestry, park lands, rights-of-way, and other areas, and the activity falls within one of the four use categories, coverage can be granted under this general permit.

Additionally, as described in this fact sheet, the permit does not cover discharges that, by law, are not required to obtain NPDES permit coverage. Of note, the CWA specifically excludes from the definition of point source, "agricultural stormwater discharges and return flow from irrigated agriculture." Nothing in this permit changes the effect of those statutory exemptions.

1.1.2. Limitations on Coverage

1.1.2.1. Discharges to Water Quality Impaired Waters

This permit specifies eligibility requirements for coverage under this general permit for discharge to impaired waters. The requirements remain unchanged from the Maryland General Permit No. 11-PE. Coverage under the permit is only available for certain discharges to impaired waters. Discharges to waters which are impaired for a substance which is not an active ingredient in that pesticide or a degradate of such an active ingredient are eligible for coverage. Discharges to waters impaired for temperature or some other indicator parameter, or for physical impairments such as "habitat alteration" are also eligible for coverage under the Maryland General Permit No. 17-PE, unless otherwise notified by the Department. Conversely, the permit is not available for the discharge of any pesticide to water that is impaired for a substance that is an active ingredient in that pesticide or a degradate of such an active ingredient. For example, application of the pesticide copper sulfate to a waterbody impaired for either copper or sulfates would not be eligible for coverage under this permit, because copper sulfate can degrade into these two substances. In this instance, Operators would have to choose between obtaining coverage under an individual permit for such a discharge or selecting some other means of pest management, *e.g.*, using mechanical means or a different pesticide active ingredient.

For this permit, the Department determined that it does not have information warranting a limitation for all impaired waters regardless of the impairment. In fact, the application of a pesticide to water in some instances actually improves the quality of the water, such as when used to control algae growth that can

deplete oxygen levels in water. It is important to note that this permit allows the Department, based on additional information, to opt not to approve coverage under the Maryland General Permit No. 17-PE, or at a later date to require an Operator covered under the Maryland General Permit No. 17-PE to apply for coverage under an individual permit.

For purposes of this permit, impaired waters are those that have been identified pursuant to Section 303(d) of the CWA as not meeting applicable water quality standards. Impaired waters for purposes of the Maryland General Permit No. 17-PE include both waters with EPA-approved and EPA-established Total Maximum Daily Loads (TMDLs), and those for which EPA has not yet approved or established a TMDL. (Maryland's impaired waters listing is available at "http://9nl.at/MD-Impaired"). Since the Department's on-line list provides the most readily-available evidence of impairment, Operators should use it when deciding whether their discharges meet the eligibility requirements regarding waterbodies impaired for specific pesticides. Thus, these requirements will further ensure protection of water quality.

Maryland Waters Impaired for Pesticides (as of 2018)

Chlorpyrifos

Chlorpyrifos was identified as a pollutant causing impairment of the Lower Patuxent River (Basin Code: 02131101). However in 2008, a Water Quality Assessment (WQA) was approved, indicating the pollutant was no longer impairing that stream. Chlorpyrifos has been used as a pesticide since 1965 in both agricultural and non-agricultural areas for: corn, soybeans, fruit and nut trees, Brussels sprouts, cranberries, broccoli, and cauliflower, as well as other row crops. Non-agricultural uses include golf courses, turf, green houses, and on non-structural wood treatments such as utility poles and fence posts. It is also registered for use as a mosquito adulticide, and for use in roach and ant bait stations in child resistant packaging. Products are sold as liquids, granules, water dispersible granules, wettable powders, and water soluble packets, and may be applied by either ground or aerial equipment. This particular pesticide has a recent history of controversy. On March 29, 2017, EPA overturned their 2015 EPA revocation and denied the administrative petition by the Natural Resources Defense Council and the Pesticide Action Network North America to ban chlorpyrifos. The Agency concluded that despite several years of study, the science addressing neurodevelopmental effects remains unresolved and further evaluation of the science during the remaining time for completion of registration review is warranted.

Chlordane

Chlordane is a man-made chemical and popular pesticide that was offered in the United States from 1948-1988. Due to concerns about environmental damage and human health risks, the U.S. Environmental Protection Agency banned the use of chlordane in 1983, except for controlling termites.

Chlordane was identified as a pollutant causing impairment of the Paint Branch, a tributary of the Anacostia River (Basin Code: 02140205). However, a Water Quality Assessment (WQA) was approved based on data collected in 2007 and 2012 that showed that levels of chlordane in fish tissue were below the threshold, indicating the pollutant was no longer impairing that stream. Chlordane was also identified as a pollutant causing impairment of the Baltimore Harbor. This impairment still exists. See Figure 3 for a map of waterways impaired by chlordane.

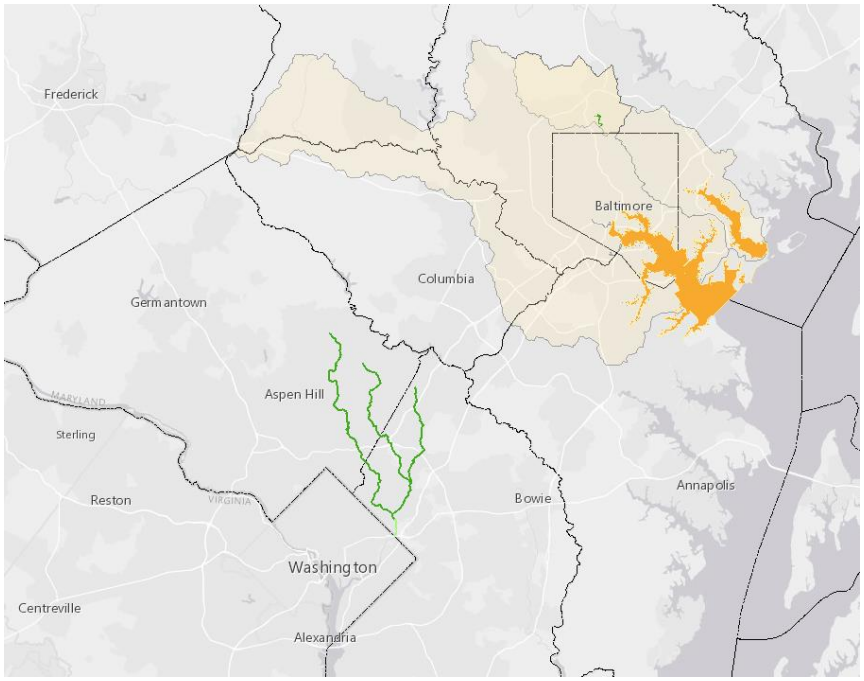


Figure 3 - Waterways impacted by Chlordane

Heptachlor Epoxide

Between the 1960s and 1970s heptachlor was used to kill termites found in the home and farmers used it to kill insects found on farm crops, especially corn crops. In the late 1970s, the use of heptachlor was phased out. By 1988, the commercial sale of heptachlor was banned in the United States. The use of heptachlor is restricted to controlling fire ants in power transformers.

Heptachlor Epoxide was identified as a pollutant causing impairment of the Northwest Branch of the Anacostia River (Basin Code: 02140205) in 2002. The extent of this listing was refined in 2010 to reflect the actual impaired waters. This listing only applies to the Northwest Branch.

See Figure 4 for a map of waterways impacted by heptachlor expoxide.

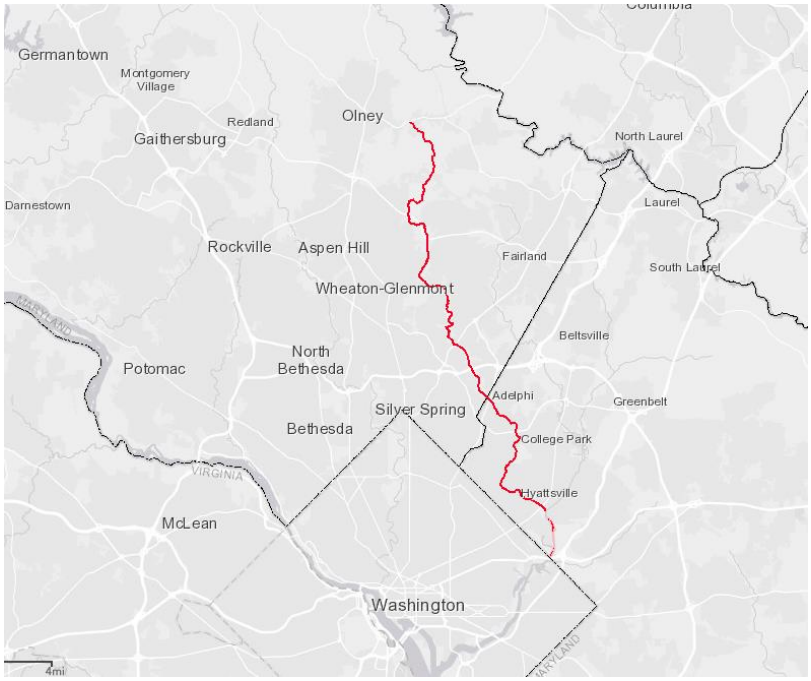


Figure 4 - Waterways impacted by Heptachlor Epoxide

Copper

There are copper based pesticides used to control aquatic weeds, or to keep fish out of inlets to dams. The only listed copper impairment in Maryland is at Sparrows Point, and is not due to use of pesticides. See Figure 5 for a map of waterways impaired for copper.

Figure 5 - Impairments for Copper

1.1.2.2. Discharges to Waters Designated as Tier 3 for Antidegradation Purposes

The EPA Pesticide General permit provides specific requirements for coverage of application to Tier 3 waters. These waters are often regarded as the highest quality waters of the United States, but the Tier 3 designation also provides special protection for waters of exceptional ecological significance, i.e., those which are important, unique, or sensitive ecologically. Maryland does not currently have any waters designated as Tier 3 (only Tier 2 as shown in Figure 6), but on the possibility that might change, we include similar requirements as provided by EPA's PGP. The assumption behind was that government resource management agencies are likely to be applying pesticides to protect the waterway (e.g. control of invasive aquatic life, protection of forest canopy). Therefore, blanket exclusion, with its inherent delay, would be counterproductive.

This permit provides coverage for discharges made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis.

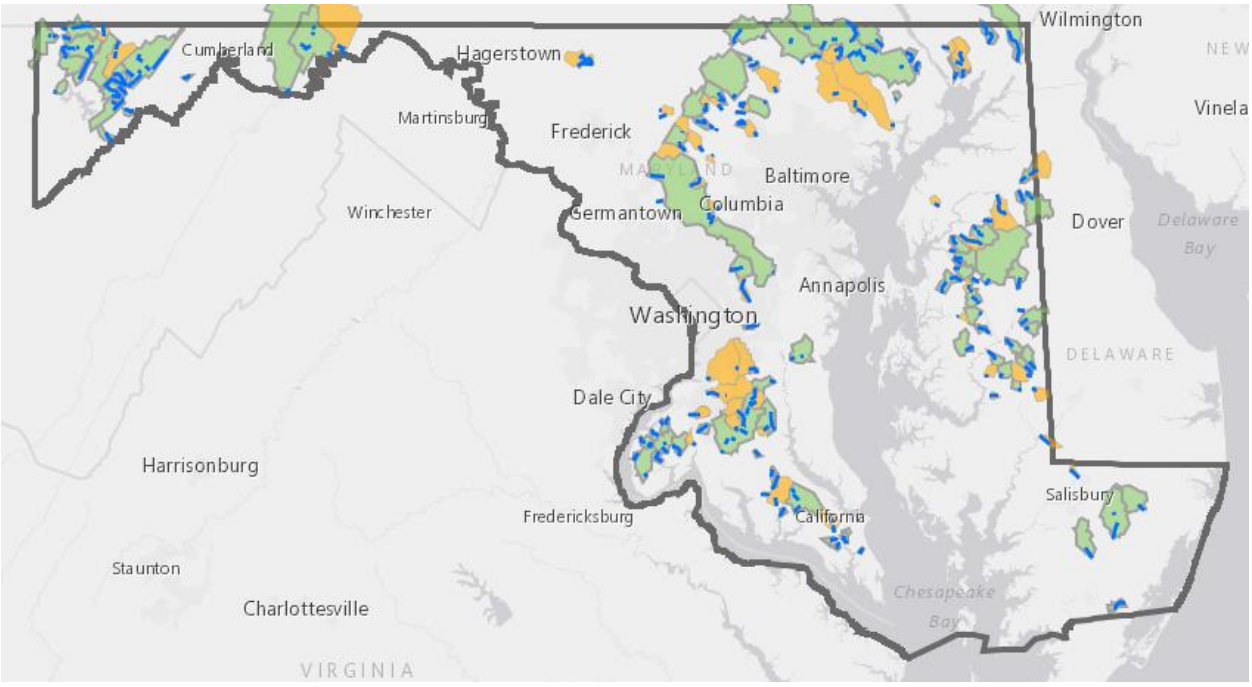


Figure 6 - Maryland Tier 2 High Quality Waters 2016 (http://www.dsd.state.md.us/comar/comarhtml/26/26.08.02.04-1.htm)

1.1.2.3. Discharges Covered by another NPDES Permit

This permit exclusion would remain unchanged from the Maryland General Permit No. 11-PE. Some discharges may be ineligible for coverage under this permit if currently covered under an individual NPDES permit and discharges from activities where the associated NPDES permit has been or is in the process of being denied, terminated, or revoked (although this last provision does not apply to the routine reissuance of permits every five years). However, Compliance with this general permit does not supersede the need to comply with any more stringent individual requirements imposed by the Department, including instances where the Department prohibits or limits a specific application such as a separate Toxic Materials Permit (TMP).

1.1.2.4. Endangered and Threatened Species

The 17-PE specifies procedures to assist in protecting federally-listed endangered and threatened species and federally designated critical habitat under the Endangered Species Act (ESA), along with species designated in Maryland, which are defined in the permit as "Desirable Species". The TMP process involved a DNR review (described above) of every application. The 17-PE includes the same requirements of the TMP, however we have laid out a process to simplify the applications for most Decision Makers. Going forward, the process for including "Desirable Species" considerations in the new 17-PE, will still involve DNR. The way we have simplified the process though, is by allowing the Decision-maker to review information prior to applying, and to involve DNR only in cases where they will need to be involved. In this way, we can allow DNR resources to focus more closely on those applications where there will be a potential impact. We can allow this by including advanced web-based tools on our website and instructions on our NOI, that lead Decision-makers through the process of identifying when "Desirable Species" may be affected. Central to this is the use of tools now available on DNR's website for the SSPRA program (nongame species), tools on MDE's website for Use III waters

(brook trout protection), and standard maps (i.e. Google Maps) for locations that discharge to the Potomac or Susquehanna.

Mapping tools for identification of desirable species protections:

- Atlantic Sturgeon protection includes the Potomac River to Great Falls (north of DC), and the Susquehanna up to the Conowingo Dam.
- Cold water species such as native trout species are protected in water designated as Use III.
- SSPRA program maintains a map on Merlin, under drop down list of "Living Resources" of "sensitive species".

The 17PE classifies discharges under the same Criteria A-F as EPA's PGP, however including the DNR program instead of the Federal Agency and the reference to Desirable Species. The provisions added to the permit are designed to ensure that discharges covered under the 17-PE are not likely to adversely affect "Desirable Species", except as provided in Criterion B, C, and, for 60 days, D, in Part I.B.2.e of the permit. These permit provisions include eligibility criteria for permit coverage as well as requiring compliance with technology-based effluent limitations in Part III.A and recordkeeping and reporting requirements for Decision-makers with discharges to Waters of this State containing "Desirable Species".

1.2. Authorization to Discharge under this Permit

1.2.1. How to Obtain Authorization

The NPDES general permit regulations, at 40 CFR §122.28(b)(2), require that Operators submit an NOI to obtain coverage under an existing general permit for which that discharge is eligible. However, those regulations, at §122.28(b)(2)(v), provide that at the discretion of the Director (which, for the 17-PE, is the Department), certain discharges can be authorized under a general permit without submitting an NOI where the Department finds that an NOI would be inappropriate for such discharges. In making such a finding, the Department must consider the following criteria: the type of discharge; the expected nature of the discharge; the potential for toxic and conventional pollutants in the discharges; the expected volume of the discharges; other means of identifying discharges covered by the permit; and the estimated number of discharges to be covered by the permit. The 17-PE is requiring submission of an NOI for certain discharges and is providing automatic coverage for certain other discharges. The requirements differ from the 11-PE, largely due to the incorporation of the TMP. However, there will still be cases where an NOI is not required. This is discussed below.

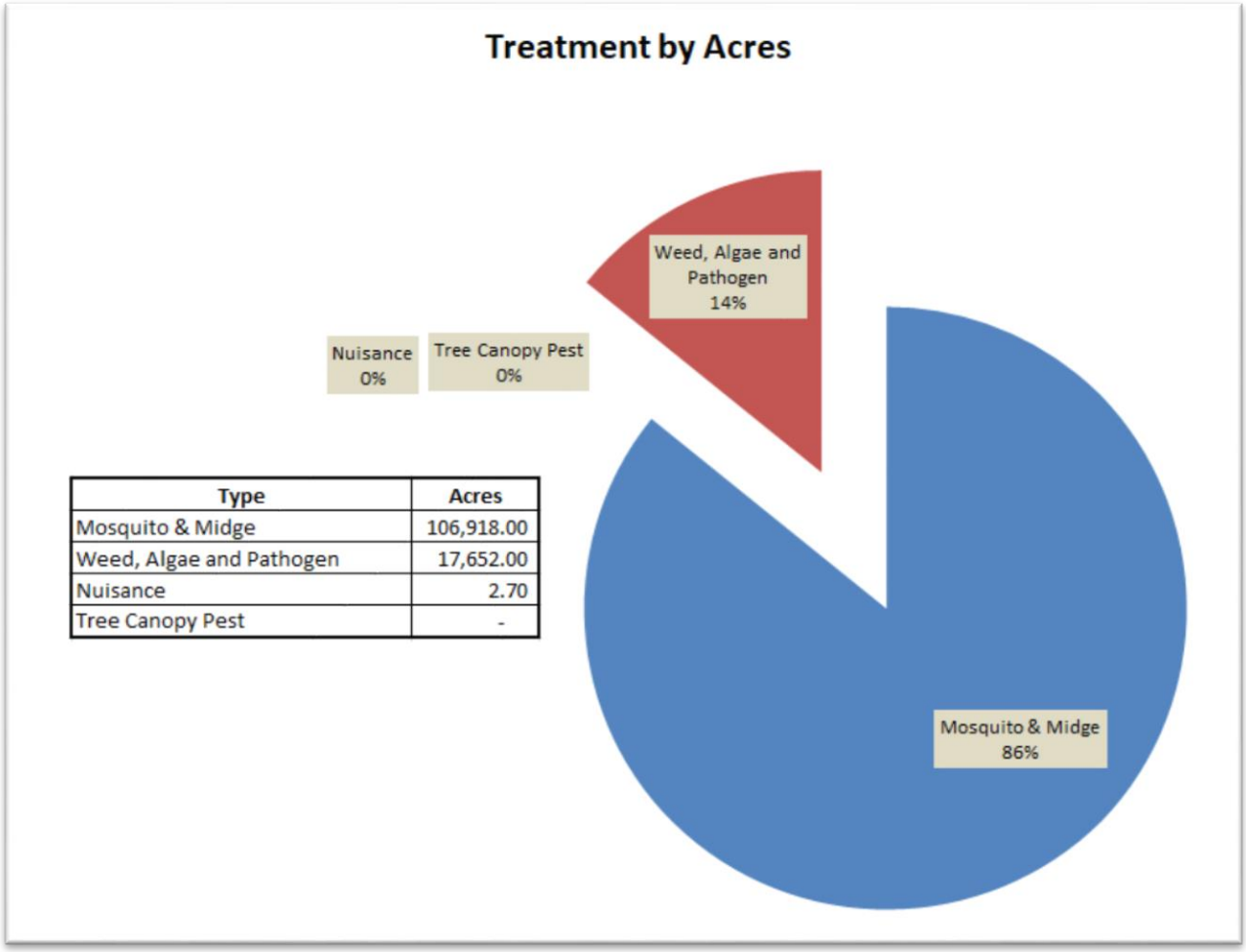
The Department is requiring submission of an NOI for certain discharges and is providing automatic coverage for certain other discharges for which the Department determined it would be inappropriate to require an NOI. The Department is exempting Operators of pesticide research and development (R&D) activities from the need to submit an NOI because these activities are typically smaller and in many instances, are already covered under FIFRA's section 5 (experimental use permits). Similarly, the 17-PE exempts these activities from many requirements of the permit where such activities are inconsistent with the research plan.

As identified in this fact sheet, the Department expects a large number of discharges from the application of pesticides spanning a wide range of Operators and activities will require NPDES permit coverage. The Department's consideration of the regulatory criteria in §122.28(b)(2)(v) is as follows based on information collected in the 17-PE development:

Type and expected nature of discharge

All discharges that would be authorized by the 17-PE involve either (1) applications made directly to or over Waters of this State to control pests in or over the water, or (2) applications to control pests near water such that pesticides will be unavoidably deposited into Waters of this State. The 17-PE is structured by pesticide use patterns. These use patterns were developed to include discharges that are similar in type and nature, and therefore represent the type of discharges and expected nature of the discharges covered under this permit. The 17-PE covers the four use patterns described previously. The EPA evaluated each use pattern independently with the goal of identifying the significant activities resulting in discharges that should be covered under their PGP. The Department reviewed and refined EPA's rationale as described below, with an eye to being consistent with TMPs issued according to the State's toxic substance regulation.

The basis for the review was the existing database of all TMPs issued over 5 years (April 2013 to May 2018). The database allows examination of number of TMPs issued, or acres of permit coverage. The TMPs are specific for each application and include location as well as the nuisance vegetation or creatures, that are the reason for the application of the toxic substance. The data was further characterized to coincide with the 4 categories in the new permit. It is notable that 86% of the TMPs issued by acreage treatment were for Category 2 for Mosquito, Midge and Black Fly Control. Category 1, which is Weed, Algae and Pathogen Control, represents the other 14%. It is no surprise that Forest Canopy Pest Control has no TMPs issued, since that category wasn't regulated under the Maryland regulation. The Category 3 nuisance species only accounted for 2.7 acres, or less than 1%.



Type	Acres
Mosquito & Midge	106,918.00
Weed, Algae and Pathogen	17,652.00
Nuisance	2.70
Tree Canopy Pest	-

Figure 7 - TMPs Categories by Acres Treated

Potential for toxic and conventional pollutants in the discharge

EPA does not expect the potential for toxic and conventional pollutants in the discharges from pesticides to vary among use patterns. EPA would expect, however, that the potential for impacts from high concentrations of toxic or conventional pollutants in the discharge would be smaller when fewer acres or linear feet are treated. The Department would generally agree with this determination, however for reasons of variability. It is easier to control a small application where it is applied over a short duration vs a large area applied over substantial time or by multiple applicators. It is also easier to monitor a smaller application area than a large area. Therefore we agree that potential for impacts increases with the number of acres treated or the linear feet treated.

In evaluating potential discharges, we evaluated the TMPs issued by county, as you can see in the following Figure. Maryland does have a higher number of TMPs issued and higher acreage treated, in county's that surround the Chesapeake Bay, especially on the Eastern Shore. Since the permit is to Waters of this State, this would make sense. The low lying areas along the Bay will have higher concentrations of phragmites, or wetlands with requirements for mosquito or other pest control. This doesn't tell us a lot about who needs to apply, but does say a lot about where to target outreach and

education as the permit is issued.

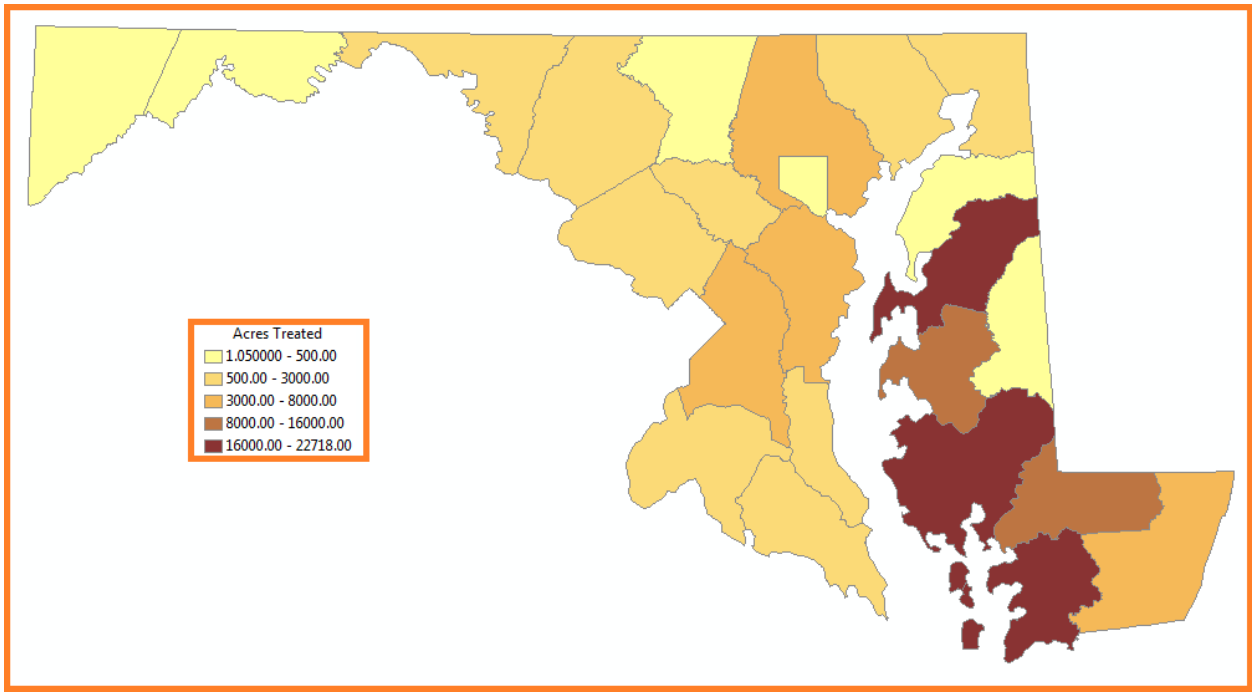
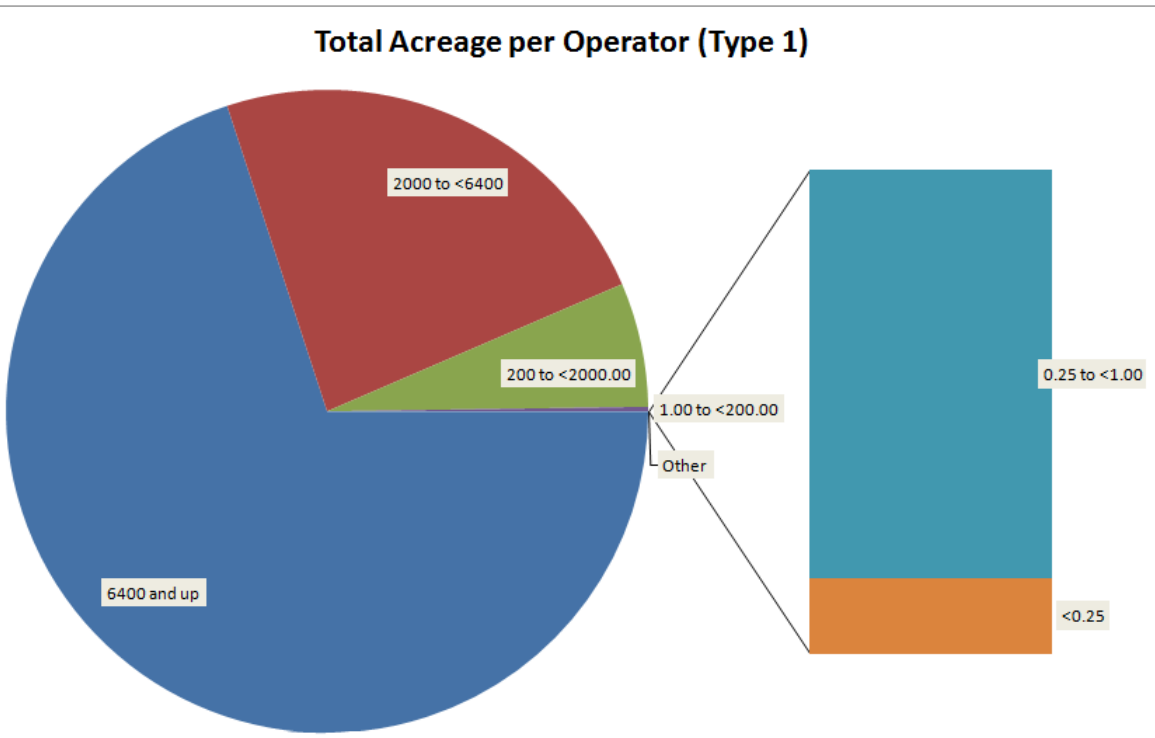


Figure 8 - Total Acres Treated Permitted by TMPs

Expected volume of discharge

EPA also considered the expected volume of discharges from each use pattern. It is difficult to estimate the expected volume of discharges for each use pattern because Pest Management Measures used by Operators to meet the permit's technology based effluent limitations may vary based on site-specific conditions. For example, the volume of the discharge may vary depending on the specific pesticide being used, the intensity of the pest pressure based on the specific pest problem, and the pest management strategy deemed to be most effective for the pest problem. Moreover, minimizing the discharge of pesticide product necessary to manage pests successfully will vary among Operators depending on which Pest Management Measures the Operator uses. Nonetheless, EPA expects that, in general, the volume of the discharge will vary proportionally with the number of acres and linear miles treated. Therefore, for all use patterns, EPA expects that the volume of the discharge for a given pesticide application will be lower when fewer acres or linear feet are treated over a calendar year. Moreover, while there may be more Operators applying pesticides to small treatments areas when compared to Operators applying to large treatment areas, the volume of discharges from Operators applying to small treatment areas is believed to be substantially less on a per applicator basis and cumulatively less than the volume of discharges from applications made by Operators applying to large treatment areas. The Department would generally agree with this as well. The longer the application takes, the more pesticides are applied.

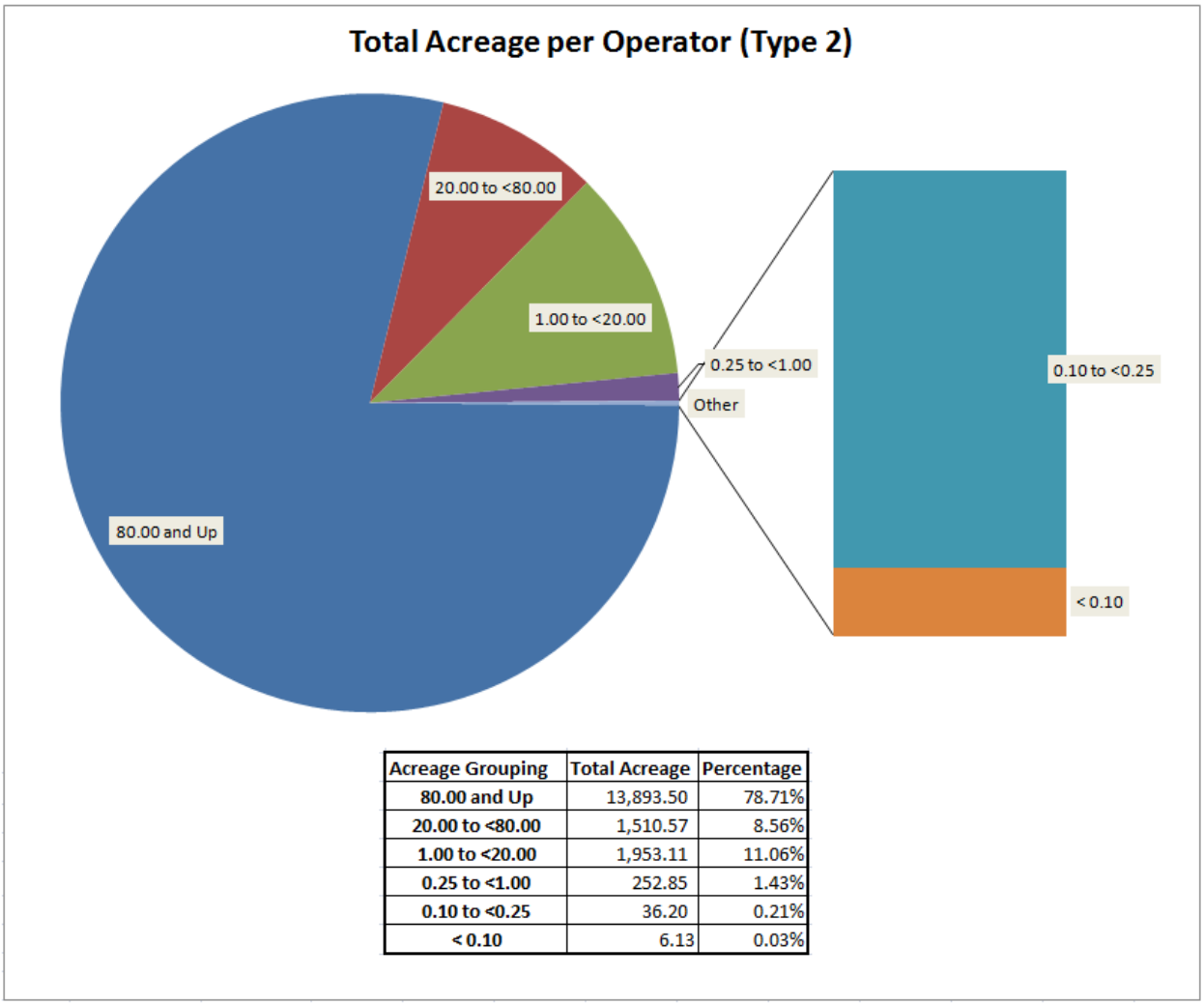
Mosquito, and other flying insects, controlled via TMPs have a similar profile, where over 69% of the TMPs issued were for properties over the threshold referred to in EPA's PGP, or 6400 acres. However, TMPs for less than 1.0 acres of treatment account for less than a combined 6 acres of treatment, as noted in the following Figure.



Acre Grouping	Total Acreage	Percentage
6400 and up	74,795.00	69.96%
2000 to <6400	25,199.00	23.57%
200 to <2000.00	6,676.00	6.24%
1.00 to <200.00	242.95	0.23%
0.25 to <1.00	4.62	0.00%
<0.25	0.85	0.00%

Figure 9 – Mosquito, Midge and Black Fly Control Grouped by Acres Treated (Type 1)

Most (78%) of the pesticides for weed, algae and pathogens are permitted with TMPs which have greater than 80 acres, as noted in the following Figure. The 80 acre threshold is important since this is the cutoff used by EPA for this category. However, at 80 acres threshold, Maryland would still have over 19% of the application of pesticides not accounted for under registrations and at operations where treated areas are over 1.0 acres. Applications for less than 1.0 acres properties account for 1.67% of TMPs issued in this category.



Acreage Grouping	Total Acreage	Percentage
80.00 and Up	13,893.50	78.71%
20.00 to <80.00	1,510.57	8.56%
1.00 to <20.00	1,953.11	11.06%
0.25 to <1.00	252.85	1.43%
0.10 to <0.25	36.20	0.21%
< 0.10	6.13	0.03%

Figure 10 - Weed, Algae and Pathogen Control TMPs Grouped by Acres Treated (Type 2)

Other means to identify discharges

The Department continues to work closely with Maryland Department of Agriculture, to emphasize the importance of applying for coverage under the TMP for all applications of pesticides in Waters of this State. Based on these efforts, the Department continues to receive many applications each year. We believe that the TMPs provide Maryland with a unique dataset not available to EPA or other states. This data has already been discussed above, and will be discussed throughout the Fact Sheet, since it was used to provide valuable insights into registration and the application of these toxic substances to Waters of this State.

Number of discharges

Lastly, EPA considered the estimated number of discharges to be covered by the permit. While the exact number of entities and thus the number of discharges which may be covered by their permit is unknown,

EPA estimated that the PGP covers more than 35,000 dischargers per year in the states for which EPA is the permitting authority. Of this total, a large majority represent dischargers performing small pesticide applications that EPA considers to have very low potential for impact. Thus, EPA decided that requiring an NOI from all dischargers would be a large burden of little value for permitting authorities and permittees alike.

In analyzing these regulatory criteria, the EPA gave particular weight to the expected volume of the discharges and the estimated number of discharges to be covered by the permit. After considering the universe of entities to be covered under the permit, EPA found a logical break between entities applying pesticides to larger areas versus smaller areas, and a difference between the types of entities generally responsible for performing such pest control activities. As a result, for the EPA PGP, NOI requirements are based on the size of areas treated and the entity making the decision to perform pesticide applications. In addition, EPA identified a need for additional information for any discharges to outstanding national resource waters (Tier 3 waters) and to waters of the United States containing NMFS Listed Resources of Concern, as defined in Appendix A of their permit, and included NOI requirements for all discharges to these waters as well.

In Maryland the number of TMPs issued provides a valuable dataset for evaluation. Below are two tables that break down the number of permits applied for by County for each of the major groupings of pesticide application. Geography and population centers play a role in the number of the TMPs issued.

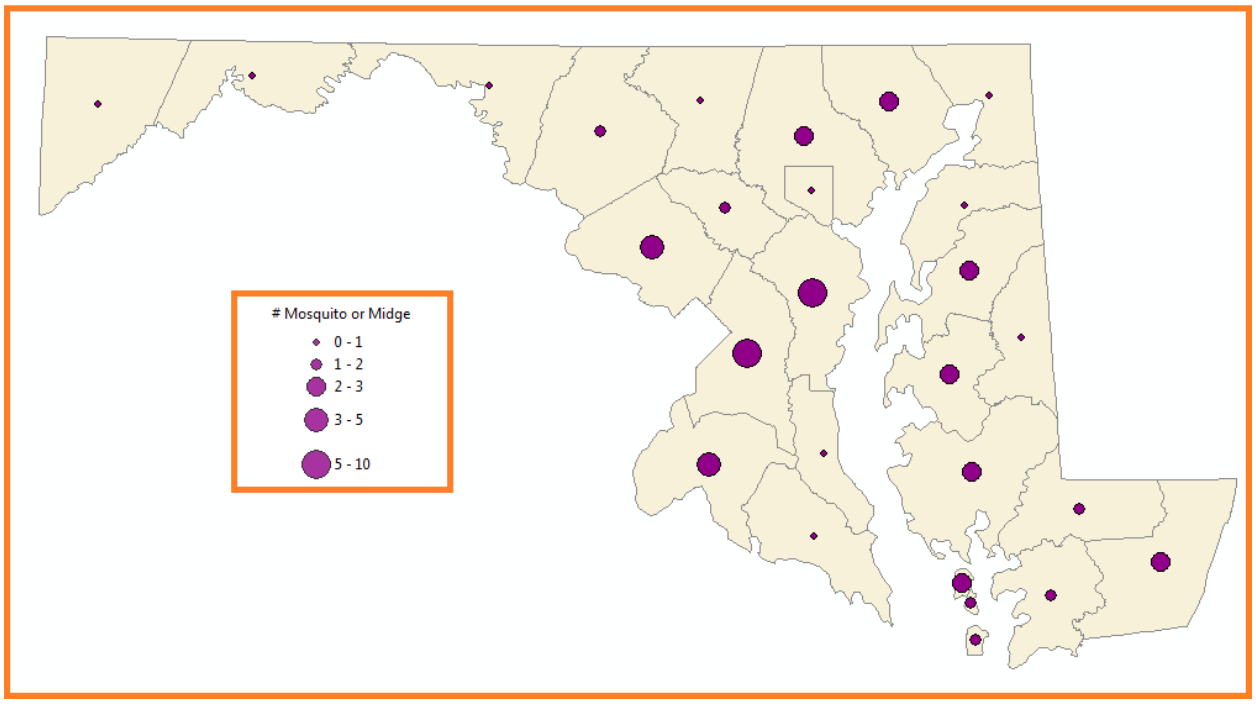


Figure 11 – Number of TMPs issued for Mosquito or Midge Control

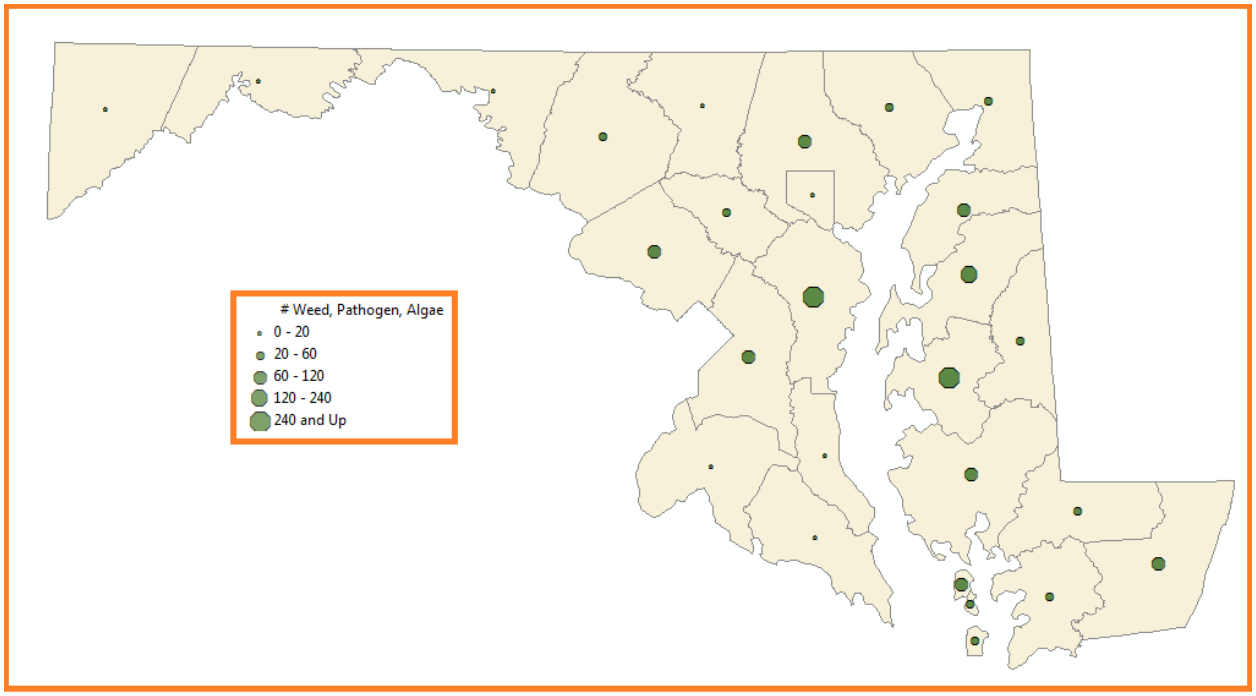


Figure 12 - Number of TMPs issued for Weed, Algae and Pathogen Control

TMPs or permit coverage under the NPDES program is location specific. There are over 1,779 active TMPs registered by the Department. We understand EPA's argument that an NOI from all 1,779 dischargers can be a large burden.

In the state of Maryland, each of these sites have Decision-makers with many options for businesses who can apply pesticides. We have approximately 5,130 commercial pesticide businesses regulated through MDA. Of those businesses, 114 are certified for tree canopy, 216 are certified for aquatic control, 688 certified for right of way and weed, 280 certified for public health including mosquito and 21 are certified for aerial spraying. These regulated businesses and their applicators represent a large number of entities to communicate with. (Full list can be found Pesticide License Renewal System at www.egov.maryland.gov/mda/pesticides).

It is to MDE's advantage to continue to work with MDA's program for licensing and certifying these businesses. The State's approach has always stressed that professional applicators or persons employing professional applicators will be covered under the pesticide permit and assures that the applicators are knowledgeable of applicable permit conditions, when applying the product where it reaches waters of this State. The Department continues to believe that this can achieve broad, comprehensive outreach to pesticide applicators by utilizing existing communications channels that have developed through MDA over the years. The Department also recognizes that pesticide applicators are also regulated under FIFRA and other state regulations, including the toxic material permit. TMPs were also reviewed by Maryland Department of Natural Resources (DNR), to verify if any sensitive species could be impacted. With the State's modification of requirements in COMAR, we believe we can move forward with an approach similar to EPA's and require NOIs for those who previously required the TMP, with thresholds for those who need to submit an NOI for coverage. The streamlined 'Lean' process and single permit will be less confusing and less burden than the two permits previously issued.

1.2.2. Decision-makers Required to Submit an NOI

To obtain authorization under the 17-PE, Operators must meet eligibility requirements, and only if required by the permit, also submit a complete and accurate NOI no later than the appropriate deadlines provided. The permit identifies which Decision-makers are or will be required to submit an NOI. Certain Operators that the Agency finds have a significant role in pest control for public health and environmental protection and should be expected to provide Agency notice of such activities are examples of those who require and NOI, whereas Decision-makers who apply pesticides to relatively small areas may not be required to submit NOIs. This is further discussed in this section. Nonetheless, the Department emphasizes that even when an NOI is not required, Operators are still subject to all applicable requirements, and as long as they are compliant are covered by the permit. The Department is requiring NOIs from the following types of Decision-makers:

- Decision-makers exceeding an annual treatment area threshold;
- Other Decision-makers specifically in the business of pest control;
- Decision-makers discharging to Tier 3 waters; and
- Decision-makers discharging to waters of this state that contain desirable species, as defined in Appendix A of the Permit.

A more detailed discussion of the Department's rationale for requiring NOIs for these three categories of Decision-makers follows.

NOIs for Decision-makers Exceeding an Annual Treatment Area Threshold

EPA developed annual treatment area thresholds for each use pattern that will only require larger Operators applying pesticides to larger areas to submit an NOI. To determine the appropriate annual treatment area thresholds that would trigger the NOI requirement, EPA's Office of Water, Office of Chemical Safety and Pollution Prevention (formerly the Office of Pesticides, Pollution, and Toxic Substances) and the ten EPA Regional Offices engaged in discussions with USDA, states as co-regulators, and representatives from industry including pesticide registrants, applicators, and land managers. Based on these discussions, the comments received during the 2011 PGP development, and EPA's best professional judgment, EPA developed annual treatment area thresholds that establish NOI requirements for applications to larger areas, which are believed to have the greatest potential for impact to waters of the United States. EPA recognized there are many unknowns concerning the size, organization, and activities of the permitted universe. Considerable variation in the availability of data and in the consistency of requirements across regions and states resulted in EPA relying heavily on its best professional judgment in setting the NOI annual treatment area thresholds for each of the use patterns. If a Decision-maker, otherwise not required to submit an NOI, anticipates it will exceed an applicable annual treatment area threshold during any time in a given calendar year of the permit cycle that Decision-maker must then submit an NOI consistent with the due dates described in Part II.C.

When calculating the size of the treatment area for comparing to an annual treatment area threshold, EPA used the term "at water's edge adjacent to waters of the United States" to identify those areas where pesticides are applied to control pests that are present near water where a portion of the pesticides will unavoidably be deposited to the water to target the pests. EPA's use of the word "adjacent" in identifying these areas was merely used to identify areas near waters of the United States and is not intended to mean "adjacent" as defined in regulation for use when defining the term "waters of the United States."

To avoid duplication of submission, EPA required that the Decision-maker responsible for such applications be the Operator required to submit the NOI. So, where a Decision-maker hires an Applicator to perform the pest control activities, the NOI is to be submitted by the Decision-maker.

Similar to EPA, MDE has used Best Professional Judgement to determine the thresholds for NOIs.

MDE's rationale for the annual treatment area threshold and Decision-makers required to submit NOIs for each use pattern is as follows:

Mosquito Control and Other Flying Insect Pest Control

EPA set different thresholds for when a NOI was required based on the category of pesticides. Then in Section 9 of their permit, tribes and territories set alternative thresholds. Guam, for instance, chose an acreage of treatment of 2 acres to be the threshold. When we compare the Maryland data for both insect and weed categories, w identified is a logical break point at 1.0 acre, where less than this threshold results in a substantial number of TMPs with very little overall acreage treated. For the grouping of the Mosquito, Midge and Black Fly, a grouping of "less than 1.0 acre" represents 19 TMPs (31% of the TMPs issued) with a total of 5.47 acres treated or 0.005% of the total number of acres treated. Therefore 32% of the Department's time has been spent issuing permits for a very small percentage of the overall acres treated.

Acre Grouping	Total Acreage	Number of TMPs
6400 and up	74,795.00	6
2000 to <6400	25,199.00	8
200 to <2000.00	6,676.00	9
1.00 to <200.00	242.95	19
0.25 to <1.00	4.62	13
<0.25	0.85	6

Figure 13 - Grouping of Flying Insects including Mosquito, Midge & Black Fly (Type 1)

As stated above, only requiring a permit for applications above a threshold of 1.0 acre will reduce the total applications substantially (by 31%) and still allow the State to retain records of over 99% of the permitted acres. EPA understands that the vast majority of mosquito control and abatement districts in the United States manages areas significantly larger than their specified threshold of 6400 acres and may reasonably expect to exceed it during any given year. Maryland data indicates that the cutoff for our state is justifiably more restrictive based on our history of regulating these applications.

In Maryland, there are two levels of Decision-makers. At the State level, the Department of Agriculture establishes statewide controls to be used, primarily through the use of larvicides. The next level of Decision-maker is at the County level, where many Counties maintain control of the pesticide use. Each of the County's programs is unique, which means that decisions for pesticide use can be made at the local County level. Decision-makers' control includes evaluating strategies for integrated pest management and agreement on use of specific pesticides. In Maryland, NOIs will be required by the County Decision-makers or the State depending on the controlling entity for the particular project. This is consistent with the way that the TMPs have been issued. Once an NOI is accepted, then the application of the specific pesticide will be covered for the applicators in that jurisdiction.

Weed and Algae Control

The evaluation of TMPs issued for Weed and Algae Control below provides a breakdown based on the actual type of treatments being used. The categories evaluated were Emerging Vegetation (EV), which includes Phragmites, Cattail, and other species that grow along the margins of wetlands; Floating Vegetation (FV), which includes plants like duck weed, which are visible on the surface of the water; and Submerged Aquatic Vegetation (SAV), which includes hydrilla and algae. The largest portion with regards to number of TMPs and total acreage regulated falls under the EV category with the SAV

category as the next-most prevalent. This rationalizes an approach of focusing our guidance to focus on EV first, followed by SAV, and lastly, FV.

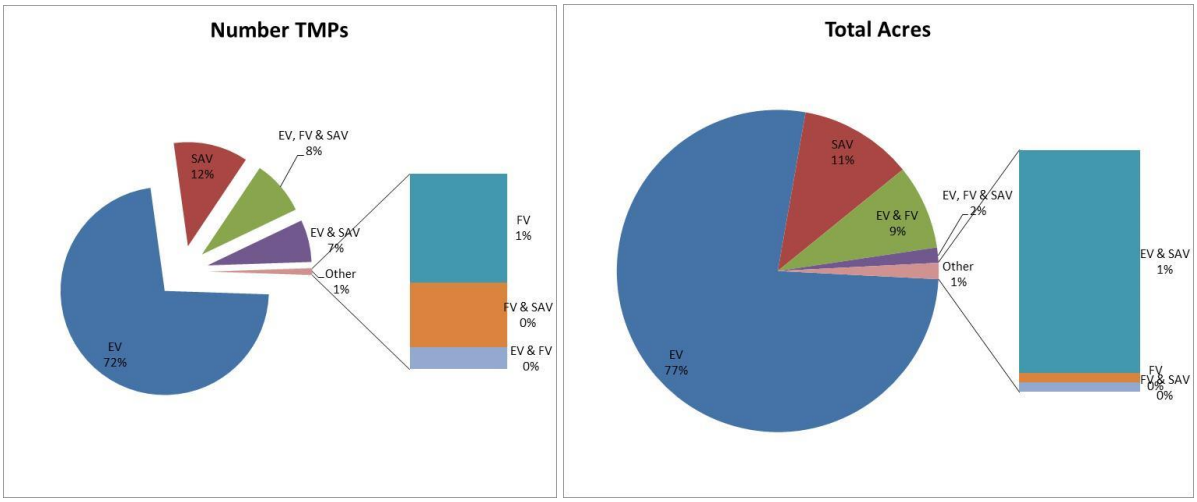


Figure 14 – Weed (EV & FV), Algae (SAV) and Pathogen broken down by number of TMPs and by acreage.

Projects for properties that are less than 1.0 acre in size collectively comprise 295 acres of treated area which represents only 1.67% of the total amount treated by TMP holders in the Weed, Algae, and Pathogen category. However, the 1,016 TMPs issued for those properties represent 60% of the total number of TMPs issued in this category. Restating this for emphasis: the Department has been utilizing 60% of its time issuing TMPs for properties comprising less than 2% of the total acreage treated.

Acreage Grouping	Total Acreage	Number of TMPs
80.00 and Up	13,893.50	20
20.00 to <80.00	1,510.57	44
1.00 to <20.00	1,953.11	601
0.25 to <1.00	252.85	604
0.10 to <0.25	36.20	245
< 0.10	6.13	167

Figure 15 - Grouping of Weed, Algae and Pathogen (Type 2)

Similar to the practice specified for mosquito control, weed control districts or similar pest control districts created specifically for the control of pests that treat areas below the threshold, should be required to submit NOIs. As such, the permit requires all weed control districts or similar pest control districts as well as any other Decision-makers treating over the annual treatment area threshold to submit an NOI. The Department has determined that this appropriately captures those two classes of entities that either (1) are established with a specific purpose of pest control or (2) treat large enough properties (over 1.0 acres) to warrant notice to the Department.

Animal Pest Control

The applications under this category are the smallest grouping, with only 4 TMPs issued. These were for ballast organisms and fish repellant during maintenance at a dam. In the broader context, EPA determined invasive and nuisance aquatic animals are most commonly treated by public agencies such as departments of fish and game, or utilities such as water management districts that manage areas of

surface water in excess of 80 acres or 20 linear miles. The high mobility and prolific breeding abilities that necessitate control of aquatic animals usually mean that pesticide applications most often occur in the entirety or large portions of the water bodies they inhabit. For example, fishery management applications using rotenone often occur in the entire lake; thus, any similar application to a lake of more than 80 acres in area will trigger the annual treatment area threshold. For this reason, EPA expects that only spot applications to eradicate small emergent populations of sessile animals or applications to very small water bodies might be excluded from an NOI requirement. Therefore, they felt that the 80-acre threshold appropriately captures the significant Decision-makers engaging in this use pattern.

Specific to Maryland, the Department is generally aware that there are ongoing treatments for invasive species such as snakeheads. Based on the low number of TMPs in the Animal Pest Control category, it is appears likely that treatments of these species were being performed without TMP coverage perhaps due to a public belief that these applications fell under the automatic coverage of the 11-PE. Since there is largely a lack of data on projects of this type, the Department would prefer to maintain a relatively low threshold (compared to EPA) to facilitate the capturing of information on these going forward. As a result, the Department has decided to apply a 1.0 acre threshold for this category. This threshold will encompass spot treatments for nuisance animals, but would exclude the previously-registered permits for ballast organisms. The Department rationalizes this exclusion because it has determined that spontaneous treatment of ballast organisms from a vessel is desirable and will support the goal of keeping invasive creatures out of the Chesapeake Bay. Furthermore, the Department's understanding is that the regulating of the Animal Pest Control category is meant for direct discharges, such as when ponds are treated for snakeheads in an effort to stem the tide of such an invasive species entering State waters. Such activities would be subject to the requirements of this permit.

Forest Canopy Pest Control

Forest canopy pest suppression programs are designed to blanket large tracts of terrain throughout which Operators may not be able to see waters of the United States beneath the canopy. EPA has set the annual treatment area threshold at 6,400 acres for this use pattern with the understanding that this will exclude only the smallest applications from the NOI requirement most of which generally occur on private lands. This threshold appropriately captures most Decision-makers engaging in this use pattern, particularly including public agencies managing large tracts of land, so the Department has determined it would be appropriate for the 17-PE as well.

NOIs for Certain Entities Regardless of the Annual Treatment Area Threshold

In addition to NOIs from Decision-makers treating the largest areas, EPA also requires NOIs from certain other types of entities with land resource stewardship responsibilities that involve the routine control of pests. For these entities, the 2016 PGP required NOIs regardless of the size of the area treated. In general, EPA expects that in many instances these entities will exceed one or more of the annual treatment area thresholds. Nonetheless, the Agency found that regardless of the size of the treatment area, any Agency for which pest management for land resource stewardship is an integral part of the organization's operations should also be required to submit NOIs. Such entities may include federal government agencies such as the U.S. Forest Service (U.S. Department of Agriculture) and the Bureau of Land Management (Department of the Interior), state government agencies such as natural resources departments, or pest control districts. EPA's rationale for imposing the NOI requirement is premised on these entities (public, quasi-public, and private) having as an integral responsibility controlling pests. These same entities operate in Maryland. Having consistent requirements is desirable. The Department will use this same approach. The specific entities required to submit NOIs regardless of whether an annual treatment area threshold is exceeded are as follows:

EPA also recognizes, however, that some of these agencies may perform ad-hoc pest control on a small-scale that is not an integral part of the organization's operations but rather incidental, for example, to its occupancy of a building. As an example, the U.S. Social Security Administration may maintain a building or group of buildings where weeds have overtaken a parking lot that is adjacent to a lake and the local office decides to control those weeds with an herbicide. Such weed control activity would not be considered an integral part of the Social Security Administration operations; rather, it would be incidental to operation of the facility. By contrast, state agencies such as a department of natural resources and federal agencies such as the U.S. Forest Service, would have pest control as an integral part of their organization's operations and as such would be required to submit an NOI. To be clear, in all instances described above, discharges would fall under the scope of the permit; however, the requirement to submit an NOI applies only to those pest control activities that are integral to an organization's operations and responsibilities.

Other specific types of entities requiring NOIs

Mosquito control districts (or similar pest control districts such as vector control districts) – In many parts of the country, state and territorial governments have established special districts for the purpose of mosquito control. Generally, these districts treat large areas that would exceed EPA's annual treatment area thresholds; however, EPA is requiring any such district, regardless of the area treated, to submit an NOI. The Department is mirroring this in Maryland.

Irrigation control districts (or other similar public or private entities supplying irrigation waters) – In many parts of the country, special districts have been established for the purpose of maintaining irrigation canals and ditches. Generally, these districts treat large areas that exceed EPA's annual treatment area thresholds; however, EPA is requiring any such district, regardless of the area treated, to submit an NOI. If such an entity were to operate in Maryland, we would apply the same requirement.

Weed control districts (or other similar special purpose districts created with a responsibility of pest control) – EPA is aware of some weed control districts created across the country with the specific responsibility to control pests. The Agency has determined that these types of entities, who perform pest management and control, as the primary function of their organization, should provide notice to the Agency of such activities regardless of the size of the area treated.

NOIs for Discharges to Tier 3

There are currently no Tier 3 waters in Maryland. If there were, any Decision-maker requesting to discharge to Tier 3 waters may seek coverage under the permit provided that the proposed discharge was necessary to protect water quality, the environment, or public health and that the proposed discharge would be short-term or would only temporarily lower water quality. Any Decision-maker wanting to engage in such an activity will be required to identify the Tier 3 water by name on their submitted NOI. Authorization to discharge to Tier 3 waters will be limited to only such named waters

NOIs for Discharges to Waters of this State Containing Desirable Species

Any Decision-maker with any discharges to waters of this State containing Desirable Species, as defined in Appendix A of the permit, may seek coverage under the 17-PE by submitting a complete and accurate NOI form that includes certifying eligibility.

Contents of the NOI

Since we are including the requirements for COMAR 26.08.03.02 in this renewal, we must also consider the procedure for obtaining approval from that state regulation, in addition to the requirements

in the requirements of 40 CFR §122.28(b)(2)(ii).

COMAR 26.08.03.02(C)(2) requires that any application shall include the following: (a) the purpose of the project; (b) a description and maps or drawings of the area involved; (c) a description of the watershed upstream and downstream from the project, or the tidal area around the project; (d) a description of the toxic substance to be used; (e) a description of the method of application; (f) name, title, and address of the person in charge of the project; (g) a description of safeguards to be used; (h) the approximate dates of the project operation; (i) a statement outlining methods to be used in the cleanup of the area following the application, discharge, or deposit of the toxic substances; and (j) any other information the Department of the Environment requires for the proper evaluation of the project.

NRA 4-213 necessitates a permit, to include DNR approval if chemicals are used for the explicite purpose of removing SAV (defined as underwater grasses and algae). Thus registrations for this use will not be processed until either approved or denied by DNR.

Pursuant to 40 CFR §122.28(b)(2)(ii), the contents of any NOI must be specified in the general permit and require the submission of information necessary for adequate program implementation, including at a minimum:

- the legal name and address of the Owner or Operator,
- the facility name and address,
- type of facility or discharges, – the receiving stream(s), and
- signed in accordance with §122.22.

The specific requirements of the EPA PGP NOI include those elements identified in the regulations described above with three additional data elements that are important to fully characterize the activities for which permit coverage is being provided, namely identification of:

- pesticide use activities that trigger the PGP requirements to develop a pesticide discharge management plan and submit an annual report;
- impaired water(s) and/or Tier 3 water(s) for which permit coverage is being requested for discharges to these waters and demonstration of eligibility for such discharges; and
- whether pesticide discharges will be to waters of the United States containing NMFS Listed Resources of Concern, and, if so:
    - what pest(s) are to be controlled;
    - the pesticide product(s) to be discharged;
    - the planned quantity and rate of discharge(s);
    - the number of planned discharges; and
    - signed certification by the Decision-maker that one of the six criteria for ESA have been met. EPA recognizes the implementation of pest management measures as specified in the permit may involve a degree of “adaptive management” such that exact timing and quantities of applications cannot be determined in advance for the duration of the permit.
- whether the discharge is to tidal waters for removal of SAV

EPA expects the Decision-maker to provide the required information to the extent feasible and consistent with the implementation of the selected pest management measures.

Using the table below, it is possible to compare similar categories of required information under each regulation implemented in the 17-PE to ensure NOI requirements fully address both regulations:

COMAR 26.08.03.02(C)(2)	40 CFR §122.28(b)(2)(ii)	Comment
The purpose of the project;	type of facility or discharges,	This would fall into one of the 4 categories. A slight change to the TMP process.
A description and maps or drawings of the area involved;	the facility name and address,	Request of address, GPS coordinates and a map, are all relevant and required fields.
A description of the watershed upstream and downstream from the project, or the tidal area around the project;	the receiving stream(s), impaired water(s) and/or Tier 3 water(s) for which permit coverage is being requested for discharges to these waters and demonstration of eligibility for such discharges;	Similar to other NOIs MDE issues, the permittee must specify the receiving stream, the use, any impairment and if it is high quality or Tier 2. We have web based tools to assist.
A description of the toxic substance to be used;	the pesticide product(s) to be discharged;	
A description of the method of application; A description of safeguards to be used;	the planned quantity and rate of discharge(s); pesticide use activities that trigger the PGP requirements to develop a pesticide discharge management plan and submit an annual report	
Name, title, and address of the person in charge of the project;	the legal name and address of the Owner or Operator	
The approximate dates of the project operation;	the number of planned discharges;	
A statement outlining methods to be used in the cleanup of the area following the application, discharge, or deposit of the toxic substances;		This is unique to the Maryland regulations.
Any other information the Department of the Environment requires for the proper evaluation of the project.	whether pesticide discharges will be to waters of the United States containing NMFS Listed Resources of Concern, and, if so, what pest(s) are to be controlled;	Maryland has required a review by the Department of Natural Resources to identify any species or resources of concern, prior to issuing coverage. This will change slightly with this permit as smaller application NOIs may not be required where there is no resource of concern.
	signed in accordance with §122.22; and signed certification by the Decision-maker	Not clearly specified by the TMP process, so new for this renewal.

Based on this comparison, the State can rely on many of the questions in the PGP, but will need to add

clarifications as required by COMAR. We will add further clarifications based on the comments in the table above.

Also, the proposed 17PE permit will be consistent with the PGP and require Decision-makers to submit changes to previous NOI forms where, for example, coverage for an additional discharge not included in the original NOI is being requested. The Department expects these NOI change requests to be submitted primarily in four instances: (1) coverage for a new or expanded pest management area or a new pesticide use pattern is being requested, (2) discharge to a not-previously identified Tier 3 water is identified for permit coverage, (3) discharge to any not-previously identified Waters of this State containing "Desirable Species" is being requested or (4) changes in the treatment area, pesticide product, method or rate of application, or approximate dates of applications for discharges to Waters of this State containing "Desirable Species". In cases where this information was previously provided to the extent feasible and consistent with the implementation of selected pest management practices, a revised NOI is not required as long as the discharge continues to be consistent with the information provided in the original NOI submission. In these four instances, Decision-makers are required to submit revised NOIs that reflect changes in the areas and types of activities for which coverage is being requested.

1.2.3. Discharge Authorization Deadlines

Once the 17-PE is effective, eligible discharges are subject to the deadlines established in the permit. Since the 11-PE had no deadlines for coverage, but the TMP had turnaround requirements, the Department is mirroring the EPA PGP deadlines, which are determined to be consistent with the TMP.

The deadlines vary based on the number or Departments reviewing information. More review time is required when a Desirable Species is located within the pesticide application area. In cases of emergency, the application date is after the use of the pesticide, however the registration is contingent on review and subject to additional restrictions once reviewed.

In addition, existing TMPs will continue until their expiration date, so a deadline of 60 days prior to expirations was added to allow for processing of the resulting NOIs.

1.2.4. Continuation of this Permit

The Maryland General Permit No. 17-PE specifies procedures for continued coverage under a general permit if the permit expires prior to a replacement permit being issued. The procedures remain unchanged from other issued General Permits in the State. In short, the expired permit would remain in full force and effect in accordance with the Administrative Procedures Act (5 U.S.C. 558(c)) and EPA's implementing regulations at 40 CFR 123.

1.2.5. Terminating Coverage

The Maryland General Permit No. 17-PE specifies procedures for terminating coverage under this general permit. They generally align with similar requirements for other general permits.

1.2.5.1. Submitting a Notice of Termination

To terminate coverage under the permit, any Decision-maker who submitted a Notice of Intent to obtain permit coverage is required to submit a Notice of Termination (NOT). The Decision-maker's authorization to discharge under the permit terminates at midnight of the day that a complete NOT is

processed. Dischargers automatically covered (as identified in Part II.A) are automatically terminated upon permanent cessation of discharge consistent with any of the criteria identified in Part II.F.2.

The Department requires Decision-makers who file a NOT to notify the Department that its obligation to manage pesticide discharges is no longer necessary for one of the approved reasons (as described in Part II.F.2). If the Department determines that the Decision-maker has not satisfied one of the conditions in Part II.F.2 for being able to submit a NOT (e.g., the Decision-maker continues to have a discharge) then the notice is not valid and the Decision-maker must continue to comply with the conditions of the 17-PE. Likewise, if the Department determines that the NOT is incomplete, the Decision-maker may be found to be in violation of reporting requirements under Section 308 of the CWA.

1.2.5.2. When to Submit a Notice of Termination

Once all point source discharges associated with pesticide application have ceased, the Decision-maker must submit a NOT, as described in Part II.F.1 of the 17-PE, within 30 days after one or more of the following conditions have been met: (1) a new Decision-maker has taken over responsibility for the pest control activities; (2) all discharges have ceased from the application of pesticides for which permit coverage was obtained and discharges are not expected during the remainder of the permit term for any of the use patterns as identified in Part I.B.1, or (3) coverage under an individual permit or alternative general permit has been obtained for all discharges required to be covered by an NPDES permit, unless coverage was obtained consistent with Part 1.3, in which case, coverage under this permit will terminate automatically.

In the 17-PE, the Department is requiring a NOT from Operators who on their own switch to a different permit to provide the Department with clear notice that the Operator's discharge is not covered under two NPDES permits. Operators who terminate coverage based on a Department's request consistent with Part II.H of the 17-PE are not required to submit a NOT.

1.2.5.3. Termination for Operators not Required to Submit an NOI

Operators covered under the 17-PE who are not required to submit an NOI are terminated from permit coverage when there is no longer a discharge from the application of pesticides or the discharges are covered under an NPDES individual permit or alternative NPDES general permit. Operators not required to submit an NOI are also not required to submit an NOT.

1.3. Alternative Permits

The Maryland General Permit No. 17-PE specifies requirements and procedures for coverage under an alternative permit. The requirements and procedures remain unchanged from the Maryland General Permit No. 11-PE.

1.3.1. Requirements for Coverage under an Alternative Permit

The Department may require an individual permit (in accordance with 40 CFR 1232.28(b)(3)(ii)) or coverage under an alternative NPDES general permit instead of the General Discharge Permit For Discharges from the Application of Pesticides. The issuance of the individual permit or alternative NPDES general permit is in accordance with 40 CFR Part 124 and provides for public comment and appeal of any final permit decision. The circumstances in which such an action would be taken are set

forth at 40 CFR 122.28(b)(3).

The Department notes that discharges from anti-foulant hull coatings, biofouling prevention, and residuals from ballast water treatment technologies are already regulated by the EPA, under the federal Clean Vessel Act, and do not require coverage under this general permit.

1.3.2. Operator Requesting Coverage under an Alternative Permit

After being covered by the Maryland General Permit No. 17-PE, an Operator may request to be excluded from such coverage by applying for an individual permit or alternative NPDES general permit. In this case, the Operator must submit an individual permit application in accordance with 40 CFR 122.28(b)(3)(iii), along with a statement of reasons supporting the request. The request may be granted by issuance of an individual NPDES permit or authorization of coverage under an alternative general NPDES permit if the reasons are adequate to support the request. Under this scenario, if an individual permit is issued, or authorization to discharge under an alternative general permit is granted, coverage under the permit is automatically terminated under 40 CFR 122.28(b)(3)(iv) on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit.

Cases where an alternative individual NPDES permit may be required:

a) A Water Quality Management plan containing requirements applicable to such point sources is approved;
b) Circumstances have changed since the time of the request to be covered so that the discharger is no longer appropriately controlled under the general permit, or either a temporary or permanent reduction or elimination of the authorized discharge is necessary; or
c) The discharge(s) is a significant contributor of pollutants. In making this determination, the Department may consider the following factors:
    (1) The location of the discharge with respect to waters of the United States;
    (2) The size of the discharge;
    (3) The quantity and nature of the pollutants discharged to waters of the United States; and
    (4) Other relevant factors.

The Department may require an Operator to apply for an individual NPDES permit only if the Department notifies the Operator in writing that a permit application is required. This notice must include a brief statement of the reasons for this decision, an application form, a statement setting a time for the Operator to file the application, and a statement that on the effective date of the individual NPDES permit the general permit as it applies to the individual Operator shall automatically terminate. The Department may grant additional time upon request of the applicant. When an individual NPDES permit is issued to an Operator otherwise subject to a general NPDES permit, the applicability of the general permit to the individual NPDES Operator is automatically terminated on the effective date of the individual permit.

Note that an individual permit is required for discharges from the application of pesticides to waters where such waters are impaired by a substance which either is an active ingredient in that pesticide or is a degradate of such an active ingredient, and for certain applications of pesticides to Tier 3 waters where such applications are not made to restore or maintain water quality or to protect public health or the environment in such a way that they either do not degrade water quality or only degrade water quality on a short-term or temporary basis. In these cases, authorization under this general permit would not have been available in the first place.

1.4. Severability

Invalidation of a portion of this permit does not necessarily render the whole permit invalid. The Department's intent is that the permit remains in effect to the extent possible; in the event any part of this permit is invalidated, the Department will advise the regulated community as to the effect of such invalidation.

1.5. Other Federal and State Laws

The Maryland General Permit No. 17-PE includes the following language: "Operators must comply with all other applicable federal and state laws and regulations that pertain to the application of pesticides. For example, this permit does not negate the requirements under the FIFRA and its implementing regulations to use registered pesticides consistent with the product's labeling. In fact, applications in violation of certain FIFRA requirements could also be a violation of the permit and therefore a violation of the CWA (*e.g.* exceeding label application rates).

The Critical Area Act (created in 1984) requires that work in the Critical Area minimize adverse impacts on water quality from stormwater runoff; conserve fish, wildlife and plant habitat; and establish land use policies to accommodate growth, but recognize that human activities in the Critical Area can create adverse environmental impacts. As a result, any work within these areas may be required to obtain and follow a buffer management plan (BMP). The areas impacted are on maps "http://dnr.maryland.gov/criticalarea/Pages/map_update.aspx". The permit therefore provides notice that any work under this 17PE may also be subject to an approved buffer management plan.

Additionally, other laws and regulations might apply to certain activities that are also covered under this permit (e.g., US Coast Guard regulations, State Toxic Material Permit)."

This part of the Maryland General Permit No. 17-PE is intended to clarify that Operators are still required to comply with other applicable laws, and that merely complying with the conditions of this permit may not meet all regulations applicable to the types of activities covered under this permit. In fact, compliance with permit terms, in some instances, establishes an expectation that Operators will comply with other laws to demonstrate compliance with this permit. For example, the Maryland General Permit No. 17-PE requires Operators to use "Pest Management Measures" to "minimize" discharges. As these terms are defined, Operators must use practices that comply with, among other things, "relevant legal requirements" to reduce and/or eliminate pesticide discharges to State waters.

1.6. Federally Listed Endangered and Threatened Species and Designated Critical Habitat.

Part II.I of the 17-PE clarifies that Operators are required to comply with conditions and/or requirements for discharges to Waters of this State from any ESA Section 7 consultation or ESA Section 10 permit for pesticides application activities covered under this permit, or as required by Maryland Department of Natural Resources.

2. Effluent Limitations

Background

The CWA requires that all point source discharges from existing facilities, or in this case, pesticide applications, meet the following:

- Technology-based effluent limitations (TBELs) representing the applicable levels of necessary control; and

- Water quality-based effluent limitations (WQBELs) as necessary where the technology-based effluent limitations are not sufficient to protect applicable water quality standards.

The TBELs contained in the Maryland General Permit No. 17-PE are non-numeric and constitute the levels of control that reduce the area and duration of impacts caused by the discharge of pesticides to State waters. In addition, these effluent limitations provide for protection of water quality standards, including protection of beneficial uses of the receiving waters following completion of pest management activities. The TBELs are developed based on:

- Best Practicable Control Technology Currently Available (BPT):
  The CWA requires BPT effluent limitations for conventional, toxic, and non-conventional pollutants. In specifying BPT, EPA looks at a number of factors. EPA first considers the total cost of applying the control technology in relation to the effluent reduction benefits, the age of the equipment and facilities, the processes employed, and any required process changes, engineering aspects of the control technologies, anon-water quality environmental impacts (including energy requirements), and other deemed appropriate factors. Traditionally, EPA establishes BPT effluent limitations based on the average of the best performance of facilities within the industry of various ages, sizes, processes, or other common characteristics. Where existing performance is uniformly inadequate, BPT may reflect higher levels of control than currently in place in an industrial category if it is determines that the technology can be practically applied.
- Best Conventional Pollutant Control Technology (BCT):
  In addition to considering the other factors specified in section 304(b)(4)(B) to establish BCT limitations, EPA also considers a two part “cost-reasonableness" test.
- Best Available Technology Economically Achievable (BAT):
  In establishing BAT, the technology must be technologically “available” and “economically achievable.” The factors considered in assessing BAT are similar to those considered for assessing BPT. BAT limitations may be based on effluent reductions attainable through changes in an Operator’s processes and operations. Where existing performance is uniformly inadequate, BAT may reflect a higher performance level than is currently being achieved within a particular subcategory based on technology transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

As per the CWA, this permit establishes two levels of technology-based controls based on BPT (for conventional, toxic, and non-conventional pollutants), BCT (for conventional pollutants), and BAT (for toxic pollutants and non-conventional) levels of control for the applicable pollutants. The Maryland General Permit No. 17-PE contains effluent limitations that correspond to required levels of technology-based control (BPT, BCT, BAT), as modeled after the PGP.

Non-Numeric Technology-Based Limitations

Under EPA’s regulations, non-numeric effluent limitations are authorized in lieu of numeric limitations, where “numeric effluent limitations are infeasible” because the discharges pose challenges not presented by other types of NPDES-regulated discharges. In such cases, narrative effluent limitations or best management practices (BMPs), designed to reduce the level of effluent discharges to acceptable levels, take the place of numeric effluent limitations. The Maryland General Permit No. 17-PE uses Pest Management Measures to represent those practices used to meet the non-numeric effluent limitations based on Integrated Pest Management (IPM) principles. Pest Management Measures represent a range of pollutant reduction practices that may be employed when applying pesticides, whether they are structural, non-structural or procedural and include BMPs as one of the components.

The non-numeric effluent limitations require Operators to “minimize” discharges of pesticide. The term

"minimize" means to reduce and/or eliminate pesticide discharges to State waters through the use of Pest Management Measures to the extent technologically available and economically achievable and practicable.

Moreover, the requirement to comply with the FIFRA label incorporates the consideration of the environmental impacts of the pesticide's use with the benefits of the pesticide's use. The use of the pesticide product will not cause unreasonable adverse effects to humans or the environment when applied according to the label directions and restrictions.

The technology-based effluent limitations remain unchanged from the EPA's 2011 PGP or the Maryland General Permit No. 11-PE. The Department continues to study the efficacy of various types of pollution prevention measures and BMPs; however, for this permit, numeric limitations are still not feasible. The technology-based effluent limitations in this permit are non-numeric due to the following factors:

- The point in time for which a numeric effluent limitation would apply is not easily determinable. Discharges from the application of pesticides can be highly intermittent and are not practically separable from the pesticide application itself. For example, application of a chemical pesticide in or around State waters would constitute a discharge of pollutants if there is a residual remaining in the ambient water after application. This discharge will immediately combine with any other discharges to that waterbody (e.g., other point sources, non-point source runoff, air deposition, etc.). Given this situation, it is not clear what would be measured to enforce a numeric limit or when it would be applicable.
- For discharges from the application of pesticides, there are often many short duration, highly variable pesticide discharges to surface waters from many different locations. It would be difficult to establish a numeric limitation at each location.
- The precise location for which a numeric effluent limitation would apply is not clear. Discharges from the application of pesticides are different from discharges of process wastewater from a particular industrial or commercial facility where the effluent is more predictable and easily identified as an effluent from a conveyance (*e.g.*, pipe or ditch), can be precisely measured for compliance prior to discharge, and can be more effectively analyzed to develop numeric effluent limitations.

Technology-based effluent limitations in this permit are presented specific to each pesticide use pattern to reflect the variations in procedures and expectations for the use and application of pesticides. These non-numeric effluent limitations are expected to minimize environmental impacts by reducing the point source discharges of pesticides to State waters, thereby protecting the receiving waters, including to the extent necessary to meet applicable water quality standards.

The pesticide discharges authorized by this permit have recreational, environmental or other human benefits. For example, permittees will discharge pesticides to control for mosquitoes and other flying insects in order to prevent the spread of infectious diseases, such as malaria, vesicular stomatitis, and West Nile Virus. Control of weed, algae, and plant pathogens promotes healthy aquatic communities and recreational and other benefits for the human population. Pesticide discharges will also control pests that threaten the health of the forest canopy, such as the gypsy moth. This permit includes permit terms which provide reasonable protection to impacted State waters without constraining the use of these pesticides which provide acceptable non-water quality environmental impacts.

Implementation of Pest Management Measures

This permit does not mandate specific Pest Management Measures Operators must implement to meet the limitations. For example, this permit may require source control without specifying how this is achieved as the methods vary between Operators and between different use patterns. For many

pesticide applications, minimization of the discharge of pesticides to State waters can be achieved without using highly engineered, complex pest control systems. Pest Management Measures can be actions (including processes, procedures, schedules of activities, prohibitions on practices, and other management practices), or structural or installed devices to prevent or reduce water pollution. Some "low-tech" approaches in this permit include using only the amount of pesticide product and frequency of pesticide application necessary to control the target pest, performing equipment maintenance and calibration, assessing weather conditions prior to pesticide application, accurately identifying the pest problem, efficiently and effectively managing the pest problem, and properly using pesticides. The permit and factsheet provide examples of Pest Management Measures, but Operators must tailor these to their situations as well as improve upon them as necessary to meet the effluent limitations.

If an Operator is required to maintain a PDMP under this permit, the factors taken into consideration for the implementation of Pest Management Measures must be included in the documentation. Pest Management Measures are expected to be tailored for each Operator based on available information and the best professional judgment of qualified personnel. If Operators find their Pest Management Measures are not minimizing discharges of pesticide adequately (i.e. Visual Monitoring identifies non-target species impacted), the Pest Management Measures must be modified as expeditiously as practicable, as further described in the Corrective Action section of this permit.

Statutes, Regulations, and Other Requirements

Operators must comply with all applicable statutes, regulations and other requirements including, but not limited to, requirements contained in the labeling of pesticide products approved under FIFRA and the State Toxic Material Permit (TMP).

Although the FIFRA labeling requirements are not effluent limitations, it is illegal to use a registered pesticide inconsistent with its labeling. If Operators are found to have applied a pesticide in a manner inconsistent with any relevant water-quality related FIFRA labeling requirements, the Department will presume that the effluent limitation to minimize pesticides entering State waters has been violated under the NPDES permit. The Department considers many provisions of FIFRA labeling -- such as those relating to application sites, rates, frequency, and methods, as well as provisions concerning proper storage and disposal of pesticide wastes and containers -- to be requirements that affect water quality. Therefore, pesticide use inconsistent with certain FIFRA labeling requirements could result in the Operator being held liable for a CWA violation as well as a FIFRA violation.

Technology-Based Effluent Limitations in the PGP

In the 2016 PGP, all Operators are classified as either "applicators" or "Decision-makers" or both. An applicator is an entity who performs the application of a pesticide or who has day-to-day control of the application (*i.e.*, they are authorized to direct workers to carry out those activities) that results in a discharge to State waters. A Decision-maker is an entity with control over the decision to perform pesticide applications, including the ability to modify those decisions that result in discharges to State waters.

The Maryland General Permit No. 11-PE was developed with the understanding that more than one Operator may be responsible for compliance with this permit for any single discharge from the application of pesticides. The Department does not delineate responsibilities between Decision-makers and non-Decision-makers. The permit's section on "Duty to Comply" makes it clear all parties involved in a pesticide application event are responsible.

2.1. Technology-Based Effluent Limitation to ALL Use Patterns (Applicator Responsibility)

As noted earlier, it is illegal to use a pesticide in any way prohibited by the FIFRA labeling. Also, use of pesticides must be consistent with any other applicable state (e.g., TMP) or federal laws.

Operators must minimize the amount of pesticide which reaches State waters by achieving maximum efficiency. Essentially, Operators shall apply the smallest amount of pesticide across the fewest number of applications necessary to adequately control the target pest. This practice is also likely to result in cost and time savings to the user. To minimize discharges of pesticide, Operators should base the rate and frequency of application on what is known to be effective against the target pest.

Common-sense and good housekeeping practices enable pesticide users to save time and money and reduce the potential for unintended discharge of pesticides to State waters. Regular maintenance activities should be practiced and improper pesticide mixing and equipment loading should be avoided. When preparing the pesticides for application, the Operator must be certain that the mixing is done correctly using only the needed amount of material. Selection of optimal pesticide loading and mixing location(s) are very important to prevent spills from reaching State waters. Some basic practices Operators should consider are:

- Inspect pesticide containers at purchase to ensure proper containment;
- Maintain clean storage facilities for pesticides;
- Regularly monitor containers for leaks;
- Rotate pesticide supplies to prevent leaks that may result from long term storage; and
- Promptly deal with spills following manufacturer recommendations.

To minimize discharges of pesticides, Operators must ensure that the rate of application is calibrated (*i.e.* nozzle choice, droplet size, etc.) to deliver the appropriate quantity of pesticide needed to achieve greatest efficacy against the target pest. Improperly calibrated pesticide equipment may cause either too little or too much pesticide to be applied. This lack of precision can result in excess pesticide being available or result in ineffective pest control. When done properly, equipment calibration can assure uniform application to the desired target and result in higher efficiency in terms of pest control and cost. It is important for Operators to know that pesticide application efficiency and precision can be adversely affected by a variety of mechanical problems that can be addressed through regular calibration. Sound maintenance practices to consider are:

- Choosing the right spray equipment for the application;
- Ensuring proper regulation of pressure and choice of nozzle to ensure desired application rate;
- Calibrating spray equipment prior to use to ensure the rate applied is that required for effective control of the target pest;
- Cleaning all equipment after each use and/or prior to using another pesticide unless a tank mix is the desired objective and cross contamination is not an issue;
- Checking all equipment regularly (*e.g.*, sprayers, hoses, nozzles, etc.) for signs of uneven wear (*e.g.*, metal fatigue/shavings, cracked hoses, etc.) to prevent equipment failure that may result in inadvertent discharge into the environment; and
- Replacing all worn components of pesticide application equipment prior to application.

Weather conditions may affect the results of pesticide application. Operators must assess the treatment area to determine whether weather conditions support pest populations and are suitable for pesticide application.

In addition, this permit requires that any Operator who exceeds the annual treatment area threshold to

identify the pest problem, implement effective and efficient pest management options, and adhere to certain pesticide use provisions. Operators are required to perform each of these permit conditions prior to the first pesticide application covered under this permit and at least once each calendar year thereafter. These additional technology-based effluent limitations are based on IPM principles. IPM, as defined in FIFRA, is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions and controls. Below is a general discussion describing the conditions for all pesticide use patterns.

Identify the Problem

Operators are required to identify the pest problem, identify the target pest, and establish an action threshold. Understanding the pest biology and ecology will provide insight into selecting the most effective and efficient Pest Management Measures (pesticidal or non-pesticidal methods), and in developing an action threshold. Action threshold is defined as the point at which pest populations or environmental conditions cannot be tolerated, necessitating that pest control action be taken based on economic, human health, aesthetic, or other effects. An action threshold helps determine both the need for control actions and the proper timing of such actions. It is a predetermined pest level that is deemed to be unacceptable. In some situations, the action threshold for a pest may be zero (*i.e.*, no presence of the pest is tolerated). This is especially true when the pest is capable of transmitting a human pathogen (*e.g.*, mosquitoes and the West Nile virus) and/or is an invasive species. In areas where aquatic weeds are problematic, it may be preferable to use an aquatic herbicide as a preventive measure rather than after weeds become established. In some situations, even a slight amount of pest damage may be unacceptable for ecological or aesthetic reasons. Sometimes pre-emergent pesticide application is needed, as a preventive measure to keep aquatic weeds at bay. Action thresholds, often expressed as number of pests per unit area, can vary by pest, by site, and by season. In a new pest management program, action thresholds may be difficult to establish and as a practical approach should first focus on major pests. As Operators gain insight and experience into specific pest management settings, the action levels can be revised up or down.

Pest Management Options

Operators are required to implement efficient and effective means of Pest Management Measures that most successfully minimize discharges to State waters resulting from the application of pesticides. Operators must evaluate both pesticide and non-pesticide methods. Operators must consider and evaluate the following options: no action, prevention, mechanical/physical methods, cultural methods, biological control agents, and pesticides. In the evaluation of these options, Operators must consider impacts to water quality, impacts to non-target organisms, feasibility, and cost effectiveness. Combinations of various management options are frequently the most effective Pest Management Measures over the long term. The goal should be to emphasize long-term control rather than a temporary fix.

Pesticide Use

Operators are required to conduct pest surveillance in an area that is representative of the pest problem and reduce the impact on the environment. Pest surveillance is important to properly time the need for pest control. To reduce the impact on the environment and non-target organisms, Operators are required to only apply pesticides when the action threshold has been met.

There are additional requirements designed for each pesticide use pattern covered under this permit, discussed in the next section.

2.2. Technology-Based Effluent Limitation to Specific Use Patterns (Decision-maker Responsibilities)

2.2.1. Mosquito and Other Flying Insect Pests Control

i. Mosquitoes

Background

There are over 3,000 different species of mosquitoes throughout the world, with approximately 176 species present in the United States. The total budgets for mosquito control in the United States exceed $200,000,000 annually (AMCA 2009). Mosquitoes can be a source of annoyance (*e.g.*, work and leisure activities), a limiting factor in economic development (*e.g.*, residential development and property value), a causal factor in decreased agricultural productivity (*e.g.*, animal weight loss/death and decreased milk production) from irritation and blood loss, and a source of disease transmission (*e.g.*, malaria, encephalitis, yellow fever, dengue, and West Nile Virus). Most of these diseases have been prominent as endemic or epidemic diseases in the United States in the past, although today only the insect-borne (arboviral) encephalitides and West Nile virus fever occur annually and dengue occurs periodically in this country. Thus, control of mosquitoes is an important public health issue. Numerous strategies are used to reduce the impact of mosquitoes but a comprehensive approach using a variety of complementary control methods is usually necessary for any mosquito control program.

MDA's Mosquito Control Section, is responsible for administering and implementing mosquito control within the State of Maryland. Typical projects undertaken for mosquito control include Public Health arboviral surveillance and testing, mosquito population surveillance activities, source reduction, biological control initiatives, ground and aerial application of insecticides and public education. The Mosquito Control Program has existed since July 1956 and currently operates under authority of Sections 5-401 through 5-408, Agriculture Article, Maryland Annotated Code. Participation in the program is voluntary and requires local government and/or community funding. In 2011, the Department entered into cooperative agreements with 16 counties for mosquito control services and conducted activities in 1,760 communities with a total estimated population of 725,000 residents.

Mosquito control in Maryland is conducted according to the concept of IPM, which is based on ecological, economic and social criteria and integrates these multidisciplinary methodologies to develop pest management strategies that are practical and effective to protect public health and the environment and improve the quality of life for Maryland residents and visitors. An IPM program consists of surveillance for larvae and adult mosquitoes; establishment of action thresholds; and selection of appropriate control strategies, using the best available technology. A practitioner of IPM must be knowledgeable of the biology and ecology of mosquitoes, monitoring techniques and best management practices.

MDA works with many communities across the state to provide routine mosquito spraying services. Additionally, when mosquito-borne disease activity is detected in an area that is not regularly served, MDA will spray the area and announce that activity on their web page and on Twitter @MdAgMosquito. This activity is called an "unscheduled spraying." The product used in the ground ULV spray program is a synthetic permethrin-based product.

Mosquitoes are members of the family Culicidae in the order Diptera (true flies). Adult mosquitoes are distinguished from other flies by the presence of a long proboscis and scales on the margins and veins of the wing. Males differ from females by having feathery antennae and mouthparts not suited for piercing skin.

Mosquitoes are insects that develop through four distinct life stages - egg, larva, pupa and adult. Only adult females feed on blood which is a required source of protein for egg development. Males and females feed on plant nectar as a source of carbohydrates.

There are three basic types of mosquito eggs - those laid singly on the water surface, each egg being buoyed by floats; eggs laid on the water surface in groups or rafts; and eggs laid singly out of the water on a surface that will subsequently flood. Mosquitoes which deposit eggs on the water surface are commonly known as permanent water breeders and include the genera Anopheles, Coquillettidia, Culex and Culiseta. Floodwater mosquitoes lay their eggs on a moist substrate, out of the water, and represent one of the most successful reproductive strategies in the animal kingdom. Female floodwater mosquitoes are attracted by chemical stimuli to oviposition sites and are not dependent on water for oviposition, hence weather has less impact on the reproductive success of floodwater species than on permanent water breeders. Floodwater mosquito genera include Aedes, Ochlerotatus and Psorophora.

All mosquito larvae are aquatic. The 60 species known to occur in Maryland have adapted to a wide range of larval habitats, including swamps, marshes, tree holes, septic ditches, rock pools, etc. All of the breeding sites have a common characteristic of stagnant pools not subject to significant wind or wave action or water flow. Additionally, the breeding sites generally have a low or non-existent population of parasites or predators that prey on mosquito larvae. Consequently, flowing streams, tidal creeks, large ponds, lakes and other large water bodies are not typical mosquito breeding sites. Larvae feed on microorganisms and particles of organic matter. Mosquito larvae must have access to atmospheric oxygen, which is obtained by means of a siphon tube that penetrates the water surface or, in some species, pierces the roots of aquatic plants. The larval stage lasts from 4 to several days and contains four separate developmental periods termed instars.

The pupal stage is also aquatic but the pupa can complete development on a moist surface. It is during the pupal phase that the transformation from an aquatic larva to a terrestrial adult takes place. The pupal stage lasts only a few days.

Adult female mosquitoes mate once during their lifetime. This occurs shortly after emergence from the pupal case. The blood feeding habits of the female vary between species. Some are general feeders while others feed only on specific groups of vertebrates such as birds or reptiles. The flight habits are also variable, with some species rarely flying more than several hundred feet from their breeding sites and others flying 20 miles or more.

Modern pest management requires surveillance data in order to plan and evaluate control work. Field surveys are the foundation of an effective program. Data on the mosquitoes with the greatest potential to adversely affect public health and comfort, including data on mosquito density and distribution, are essential in order to plan and conduct effective control measures. In Maryland, the species occurring in the greatest abundance, or that have the greatest impact on human comfort, economic growth and public health, are Ochlerotatus sollicitans, Ochlerotatus taeniorhynchus, Aedes albopictus, Aedes vexans, Ochlerotatus canadensis, Anopheles crucians/bradleyi, Anopheles quadrimaculatus, Culex pipiens, Culex salinarius,Coquillettidia perturbans and Psorophora columbiae. Several Aedes and Ochlerotatusspp. and Coq. perturbans are implicated in the transmission of eastern equine encephalitis to humans, equines and ratites. Dog heartworm in canines is the most common mosquito-transmitted disease in Maryland, with several vector species. Culex species are important vectors of West Nile encephalitis and St. Louis encephalitis. Aedes albopictus, popularly known as the Asian tiger mosquito, is a recent introduction to the Maryland mosquito fauna. It was introduced into the United States from Asia by the international used-tire trade and has spread throughout much of the country via interstate tire shipments. This species has become a major pest in several urban areas of Maryland and is a vector of West Nile encephalitis. The newest addition to the mosquito fauna of Maryland is Aedes japonicus, first found in Frederick County in 2000. Ae. japonicus is also a beneficiary of the international tire trade and

an excellent vector of disease.

Larval surveillance requires extensive logistical preparation due to the size and remoteness of many breeding areas. The largest expanse of breeding area exists in the southern Eastern Shore region of Maryland. In general, mosquito larval habitat is most widespread in the coastal plain. High-level aerial photography and satellite imagery are used for rural areas to locate potential breeding areas based on soil and plant community associations. In urban environments, Ae. albopictus and Cx. pipiens are found in obscure breeding sites in yard to yard searches.

Potential breeding areas are subject to "ground truthing" to confirm the location of the sites and measure the presence of mosquito larvae. Confirmed breeding areas are mapped on United States Coast and Geodetic topographic maps (scale 1:24,000), or larger scale city maps, and used as a reference for future surveillance. Frequent and regular inspections of breeding areas are carried out from March through September to determine larval density and species composition.

Larval surveillance data are used to guide the course of the control program and are the most important field data available to the mosquito control manager. This information is used in the decision-making process of whether or not to initiate control efforts, what type of control to employ and in evaluating the effectiveness of the control.

Breeding areas that consistently produce large numbers of important pest or vector species and are located within flight range of a community are considered as potential sites for control. Several Aedes and Ochlerotatus spp. are capable of long distance (up to 20 miles or more) dispersal flights. Other species, such as Ae. albopictus, Oc. canadensis, and Coq. perturbans are weaker fliers (1-5 miles). Culexand Anopheles mosquitoes have a much more restricted flight range than do mostAedes and Ochlerotatus mosquitoes and breeding areas for the former species more than two miles from a community are not considered for control. All breeding sites within a community, or close to the perimeter of a community, are designated as primary control sites for control of mosquito larvae.

Meteorological conditions significantly affect breeding sites. A prolonged drought will evaporate the surface water from a wetland and temporarily halt mosquito larval production. However, a drought will also eliminate the population of mosquito predators and exacerbate mosquito breeding, particularly in areas producing salt marsh Ochlerotatus species, when surface water returns. A summer with frequent rainfall and/or flooding tides will maintain a higher water level, which usually favors larval production of Anopheles and Culex species, but may also boost the population of predators and eliminate mosquito production. Therefore, a good larval surveillance program cannot be static. It must be dynamic and flexible to accommodate fluctuations in weather and land use patterns.

Surveillance for adult mosquitoes is conducted using traps and landing rate counts. Traps are an easy, relatively low cost way to obtain an index of the number of mosquitoes in an area, but, data are subject to wide variation. Trap data provide a good historical record if trap locations are constant from year to year. Trap collections are time-consuming to process and the information on mosquito abundance is often delayed for several days after the catch is made and of reduced value from the standpoint of operational control. For arboviral surveillance, traps utilize carbon dioxide as an attractant to increase trap capture rates.

In Maryland, a trap designed by the Communicable Disease Center (CDC) is the trap type generally used to monitor pest and vector adult mosquitoes. The CDC trap is battery-powered and easily portable. For pest surveillance, the trap uses no source of attraction other than a small light. A collection of more than 10 anthropophagous (human biting) female mosquitoes per night of trap operation is considered to be the level which causes discomfort and/or complaints from the majority of people. The light trap action threshold for ground spraying of adult mosquitoes is 10 per trap night. The action threshold to

suppress pest populations of adult mosquitoes by aerial spraying (application of insecticide by an aircraft) is a light trap collection of 100 female mosquitoes.

Landing rate counts provide immediate indicators of adult mosquito activity. The counts are taken for a short period of time at specific, predetermined locations. Inspectors serve as "bait" to attract mosquitoes which attempt to blood feed. A count is made of the number of mosquitoes landing on the readily visible portions of the inspectors' bodies, below the waist, during a two minute interval. Landing rate counts for salt marsh Ochlerotatus species and Ae. albopictus can be taken during daylight because these species will actively attempt to blood feed at that time. However, most other species, particularly Anopheles spp. and Culex spp., must be sampled during twilight periods, or at night, because of their nocturnal activity. The action threshold for landing rate counts to justify ground spraying for the control of adult mosquitoes is 3 mosquitoes in 2 minutes. The action threshold for aerial spraying is 12 mosquitoes per minute.

The Maryland Department of Agriculture (MDA) and the Maryland Department of Health and Mental Hygiene (DHMH) collaborate to conduct a surveillance program to detect mosquito- borne viruses of public health concern. The program monitors the occurrence of Zika Virus, eastern equine encephalitis (EEE) virus, West Nile virus (WNV), and St. Louis encephalitis (SLE) and other viruses in mosquitoes, wild birds, domestic animals and humans. These viruses are maintained in nature in mosquito cycles. Isolation of viral presence in the mosquito cycle provides an early warning of virus transmission and is cause for increasing public awareness campaigns to reduce risk of disease and to take proactive steps for mosquito control to further reduce the risk to humans, domestic animals and zoo animals.

West Nile virus has affected every region of Maryland and is now considered as being endemic throughout the state.

The primary goal of the Mosquito Control Section of MDA is to prevent the occurrence of mosquito-borne disease in humans and domestic animals. When evidence of mosquito-borne disease is detected, measures are taken to reduce vector mosquito populations to as low a level as practical. After the surveillance and demographic data are analyzed and a decision is made that control efforts are justified, several options are available. These range from complex to simple, inexpensive to costly, and short-term to long-term. What option to utilize is dictated by the extent of the mosquito problem and the available resources.

<u>Source Reduction Using Open Marsh Water Management (OMWM)</u> - OMWM is a water management technique directed toward the control of salt marsh Ochlerotatus larval mosquitoes without using pesticides. OMWM is an example of applied ecology. It accomplishes control by incorporating physical control (digging ditches and ponds in the marsh) and biological control (fish live in the ditches and ponds and eat mosquito larvae). It is a long lasting form of control and a system that, when properly designed, has a life expectancy of 20 years or longer. Due to this longevity, OMWM is the most economical form of control, despite the initial high investment. OMWM not only provides excellent control of mosquitoes at their source, it utilizes wildlife management techniques to enhance the high salt marsh habitat for a variety of game and non-game species of fish and wildlife. The ponds constructed for OMWM projects provide habitat for submerged aquatic grasses, and the ditches enhance the tidal marsh food web while reducing nutrient flow into the Chesapeake Bay.

Modern Maryland OMWM techniques are designed to achieve long-lasting, effective control of mosquito populations while maintaining and often enhancing the ecology of the tidal marsh environment. These management techniques are considered by many environmental scientists to be acceptable alterations to the tidal marsh habitat since they promote the objectives of mosquito control agencies, pesticide reduction advocacy groups, and environmental protection groups. Other environmental scientists argue that no physical change of the tidal marsh environment is acceptable. For

example, there is concern that OMWM changes may adversely impact the black rail, a species listed as in need of conservation by the Natural Heritage Program of the Maryland Department of Natural Resources. Since 1991, OMWM has been suspended in Maryland because regulatory agencies have virtually stopped the issue of necessary permits. Most source reduction projects since 1991 have been maintenance of previously managed areas.

Biological Control - Larvivorous fish, invertebrate predators, parasites and diseases to control mosquitoes have been widely used throughout the world. Almost always, biological control agents are used against mosquito eggs, larvae and pupae. Biological control of adult mosquitoes using birds, bats, dragonflies and frogs has been advocated, but supportive data are anecdotal. There is no documented study to show that bats, purple martins, or other predators consume enough adult mosquitoes to be effective control agents. The Mosquito Control Section does not advocate the establishment of bat boxes by the public due to the increased risk of human exposure to rabies.

The use of fish is particularly effective in controlling the aquatic stages of the mosquito. The Mosquito Control Program maintains several rearing ponds throughout Maryland to propagate Gambusia holbrooki (mosquito fish) for distribution to appropriate mosquito breeding sites. The widespread use of larvivorous fish such as Gambusia, a native fish to the Chesapeake Bay and its tributaries, has been discouraged by the Maryland Department of Natural Resources due to concern the fish may prey upon threatened or endangered species of amphibians and fish. As a consequence of this concern, the biological control initiative using fish has been reduced to stocking them only in artificial wetlands, such as stormwater retention ponds.

Temporary Control - Control of mosquitoes with the use of insecticides is commonly referred to as temporary control because the non-residual insecticides used in the Maryland program provide only short-term reduction of mosquito numbers. The temporary control program is divided into two categories - larviciding and adulticiding. Insecticide applications are made under the supervision of certified pesticide applicators, pest control category VIII, and regulated by State and federal laws. Several certified applicators are employed by the Mosquito Control Section. No restricted use pesticides are applied in Maryland for mosquito control by State or local government agencies.

Larviciding - Insecticide application directed against larval mosquitoes is an important component of an IPM mosquito control program. Larviciding is the most efficient type of temporary control. An important part of the mission of the Maryland Mosquito Control Program is to prevent, or significantly reduce, adult mosquito annoyance to humans, pets and domestic livestock. It is more efficient to eradicate or substantially diminish a brood of mosquitoes while they are concentrated as larvae in the aquatic habitat than to control them as adults. For example, the adult mosquitoes produced on one acre of breeding area can disperse over 50,000 acres, assuming a flight range of five miles.

All larvicide applications are based on a demonstrated presence of mosquito larvae. Larval inspections are conducted by trained personnel capable of identifying instar stages of mosquitoes and distinguishing among various genera. Inspections for Aedes and Ochlerotatus larvae must be conducted quickly after heavy rains or flooding tides because, during the summer, larvae can develop at a rate of one instar per day. Therefore, breeding sites must be located and treated within five days after flooding. In most instances, when widescale flooding has occurred, only a small portion of the breeding area can be inspected and a determination made on the need for treatment.

Larvicides are applied using manually carried or vehicle-mounted spreading equipment or from specially equipped aircraft. Ground equipment application is economical and has the advantage of being able to specifically apply insecticides to larval breeding sites only, as opposed to aerial application where an entire area is treated and much insecticide falls on dry ground. However, aircraft are needed when large areas must be treated within the short time available for treatment. Aircraft are able to apply

insecticide evenly over large areas that would be difficult or impossible to traverse on the ground.

All larvicide applications have been made under permits issued by the Maryland Department of the Environment TMPs. Permit applications are made on a county basis for specific areas within the county and for individual insecticides. The permit allows a limited number of insecticide applications within a specific time frame. The permit review process is time consuming and often prevents the timely application of mosquito larvicides to new or previously undocumented breeding sites.

The insecticides currently used for larviciding in Maryland include Bacillus thuringensis var. israelensis (B.t.i.), a naturally produced bacterial toxin, and methoprene (Altosid), a synthetically produced insect growth regulator. B.t.i. is one of the least toxic materials available for larviciding and, when applied from the ground, it is usually effective. It is the most commonly used larvicide for ground application. B.t.i. must be ingested by the larvae in sufficient concentration to cause death by disruption of the function of the larval midgut. Due to the poor operational results found in our quality control evaluations, B.t.i. is seldom applied by aircraft in Maryland. B.t.i. produces varying levels of control depending on water quality, amount of and type of vegetation and species to be controlled. Under ideal conditions, B.t.i. will control larvae for up to 24 hours.

Bacillus sphaericus is a relatively new bacteria larvicidal product that is very effective against Culex mosquitoes. It is used in Maryland primarily to control Culex salinarius and Culex pipiens. Bacillus sphaericus can be effective against Culexmosquitoes for up to 21 days.

Two other bacterial products have recently been registered as mosquito larvicides. Both provide control over a wider range of mosquito genera and habitat types than B.t.i.. A product that combines B.t.i. and B. shaericus to produce an additive toxic effect controls multiple mosquito genera where they occur in the same breeding habitat. Sacchropolyspora spinose, the most recently registered bacterial larvicide product, appears to provide consistent control over most mosquito genera and is available in extended release formulations that control larvae over long periods. Both products are more expensive than B.t.i. (approximately 5 times) and have limited, special use in Maryland.

Methoprene is the most commonly used larvicide for aerial application and is also commonly applied by ground equipment. This product provides 90-100% control of emergence of adult floodwater mosquitoes. There has been no observed negative environmental impact as a result of the use of methoprene for mosquito control in Maryland to our knowledge.

Larviciding is not allowed on certain State parks, Federal refuges or Assateague Island National Seashore. This is an important factor impacting mosquito control near these State and federal lands, which serve as a source of adult mosquitoes to the nearby residential areas.

Criteria for Application of Larvicides - Populations of mosquito larvae are sampled using a standard dipper which is immersed and quickly withdrawn from water. An assessment of the number of larvae, instar stages and number of pupae, is made. Field identification of mosquito larvae is made to the genus level. Wetlands are sampled to determine the presence, spatial distribution and density of a larval population. A decision to use a larvicide to control a larval population takes into consideration the type of mosquito and the distance to a residential area.

The physical nature of some larval habitats makes standard larval dipping difficult; samples may not be representative of the actual larval populations. In sites such as, but not limited to, dredged spoils containments, wetlands with heavy phragmites encroachment, cattail ponds, stormwater management ponds and containers, the use of larvicides is warranted based on the observed presence of larvae, historical treatment records and/or adult mosquito surveillance data. Wetlands and containers that lie in or near residential sites will be treated on the demonstrated presence of larvae.

A larvicide may be applied to a wetland for the control of mosquito larvae when larvae are present at a minimum average of one larva per dip. Breeding habitats with a minimum larval density of one per dip and that lie within a two mile radius of an area to be protected may be treated. The breeding sites of Ae. vexans and Coq. perturbans will be treated if they lie within a five mile radius of an area to be protected. For long distance flying salt marsh species, Oc. sollicitans and Oc. taeniorhynchus, breeding sites may be treated without regard to distances to protection areas.

Adulticiding - Despite all efforts to prevent adult mosquito populations from reaching annoyance levels, it is inevitable that outbreaks will occur. When this happens, it is the mosquito control manager's responsibility to reduce mosquito numbers to a point below the action threshold to protect public health and comfort. Adulticiding is most effective when the adult mosquito population is localized or when spraying is carried out uniformly over a large area to prevent reinfestation of treated areas. Multiple spraying, spaced 2 to 3 days apart, may be necessary to reduce the population of adult mosquitoes to a low level, particularly if mosquito-borne disease transmission is possible.

Localized adult mosquito populations which exceed the action threshold can be managed with an application of insecticide dispersed from truck-mounted, ultra low volume (ULV), aerosol generators. The principle insecticide applied for adult mosquito control in Maryland is permethrin, synergized with piperonyl butoxide (PBO). ULV units disperse the synergized pyrethroid insecticides (0.003 lb. active ingredient per acre) over an effective swath width of 300 feet. Applications ideally are made when mosquito activity is high, wind velocity is 2 to 10 mph, air temperature is between 60 to 85 degrees F, relative humidity is high and a temperature inversion exists.

Aerial spraying for adult mosquito control can be conducted when a large number of mosquitoes, exceeding the aerial spray action threshold, infest a community or populated area of 500 acres, or more. Spraying is conducted with a Maryland Department of Agriculture-owned Beechcraft King-Air, twin-engine, fixed-wing aircraft equipped with an Ag-Nav global positioning system. The principal insecticide used for aerial adulticiding is naled (Trumpet EC) applied at the rate of 0.8 to 1.2 fluid ounce per acre (0.08 to 0.10 lb. a.i./acre). Aerial spraying is conducted when weather conditions favor high mosquito activity and maximum retention of the spray particles within the treatment area. Night vision technology has enabled the aircraft to be operated at night since 2005, resulting in a higher degree of mosquito control. Due to the high mosquito population needed for justification (12 mosquitoes per minute landing rate count and/or 100 mosquitoes per light trap), most aerial spraying is conducted in the southern Eastern Shore region of Maryland.

Public Education - Mosquito control staff members meet with the press, attend community meetings and communicate one to one with residents to emphasize what steps can be taken by individuals to reduce mosquito problems. Cleanup of old tires, buckets, cans and any other water holding containers can significantly reduce mosquito breeding sites in a community, particularly in parts of the State with few natural wetlands. Window screening will keep mosquitoes outdoors. Pet owners are urged to have their dogs protected against dog heartworm disease, which is transmitted by mosquitoes. Owners of horses and other equine are urged to have their animals vaccinated twice a year to prevent occurrence of eastern equine encephalitis.

An initiative in 2000 and 2001 conducted large scale mailing of information about Ae. albopictus and its control. This information was distributed in communities known to be infested with Ae. albopictus and included parts of Anne Arundel, Baltimore, Calvert and Prince George's counties and Baltimore City. Residents were urged to conduct neighborhood cleanups to remove containers used as mosquito breeding sites. The evaluation of this effort has not been able to demonstrate any appreciable effect on reducing the mosquito breeding containers in residential areas.

Traditionally, homes and commercial developments were sited away from wetlands and located in

breezy, open areas. However, during the past four decades, there has been a shift in development areas. Homes frequently are built adjacent to, or in, wetland areas. This occurs because of several possible factors, including: (1) lack of, or greater expense for, upland sites; (2) a desire to live on or near waterfront property; (3) diminished public concern about mosquito bites or mosquito-transmitted disease; and (4) reliance on government, private contractors or self to alleviate problems associated with wetlands. In addition to mosquitoes, residences near wetlands frequently are impacted negatively by the presence of deer flies, horse flies, stable flies, biting midges ("no-see-ums"), black flies and ticks.

The Mosquito Control Section receives numerous service requests from residents of communities in or near wetlands who were unaware that their community was prone to infestation by biting arthropods prior to moving there. Planning and zoning agencies could restrict development in areas known to be potential sites of arthropod-borne disease and nuisance. At the very least, it should be an ethical obligation of realtors to disclose to buyers that living in or near some types of wetlands will subject residents to greater than normal exposure to insect and tick bites. The Mosquito Control Section is available to advise planning and zoning agencies and realtors on known mosquito producing wetlands. This public education would reduce insecticide use by government agencies, contractors and homeowners, and have other ecological benefits.

Products Advertised for Mosquito Control - There are numerous products being advertised today alleging that they are effective for mosquito control. Unfortunately, these products have limited or no value in reducing mosquito annoyance.

A mechanical trap (the Mosquito Magnet(R)) is promoted as being capable of "controlling" adult mosquitoes in an area of up to 1 acre. This trap was evaluated by MDA in 2001 and, while it was found to be a good tool for collecting mosquito specimens for surveillance purposes, the claim of control could not be corroborated.

Electronic devices that emit a high frequency sound are advertised as being effective to repel mosquitoes, as well as other pests. These claims are false. The devices do not deter female mosquitoes from attempting to bite, nor do they cause mosquitoes to flee from the sound.

Electrocuting devices, popularly known as "bug zappers", do not control mosquitoes. Studies have shown that mosquitoes make up less than one percent of the insects killed by the zappers. Beneficial insects such as beetles and moths make up the bulk of the catch.

Plants such as the Citrosa plant are claimed to have a mosquito-repelling quality. The Citrosa plant is a genetically engineered houseplant that incorporates tissue cultures of the grass that produces citronella oil into hybrid varieties of geranium to produce a cultivar that emits a citronella-like odor. Citronella oil does repel mosquitoes, and it is a logical assumption that the Citrosa plant's aroma would produce similar results. However, the citronella-like aroma of the Citrosa plant does not repel mosquitoes. Mosquitoes have been observed resting on the Citrosa leaves. Crushing the Citrosa leaf and rubbing it on the skin does not repel mosquitoes. The idea of the Citrosa plant was sound, but the results do not prove the hypothesis that it is effective in repelling mosquitoes.

Mosquito Control Policy – MDA provides mosquito control services, in cooperation with participating county governments, as authorized by State law. MDA's preferred mosquito control strategy is the reduction of mosquito larvae numbers by source reduction, biological control agents or use of biological insecticides. Adult mosquito control, by ultra low volume (ULV) application of insecticide, is conducted using aircraft or truck-mounted application equipment in residential areas for nuisance abatement and to protect public health from mosquito-borne disease.

Insecticides which control mosquito larvae generally have a narrower range of impact to nontarget species and can be applied in a more site-specific manner than mosquito adulticides. Larvicides are, therefore, preferred over adulticides. However, if larviciding is not possible due to weather conditions, logistical problems (area too large, too remote), or larvae are in a prohibited/restricted area (wildlife refuge, national park, military reservation), adult mosquito control is a valid option, and may be the only control option.

Mosquito Control Larvicides - The following non-residual products are recommended for general use in mosquito larvae habitats in Maryland, including freshwater marshes, salt marshes, woodland pools, ditches and dredged spoil disposal areas:

- Altosid Liquid Larvicide - active ingredient - methoprene
- Altosid Liquid Larvicide Concentrate - active ingredient - methoprene
- Natular - active ingredient - spinosa - Saccharopolyspora spinosa
- Vectobac or Aquabac - active ingredient - Bacillus thuringiensis israelensis

Vectolex is a biological pesticide with the active ingredient Bacillus sphaericus. It displays limited residual activity. Vectolex is recommended for control of Culex mosquito larvae. Vectolex has a low activity against other genera of mosquitoes and is not recommended for control of Aedes, Psorphora, Anopheles, etc.

The residual products listed below have restrictions prohibiting their use in water inhabited by fish. Use of these products is acceptable in other mosquito breeding habitats:

- Altosid Briquets - active ingredient - methoprene
- Altosid XR Briquets - active ingredient - methoprene
- Altosid Pellets - active ingredient - methoprene
- Altosid XR Granules - active ingredient - methoprene

MDA is very concerned about the effects of pesticides on non-target organisms, like honeybees and bats. Truck mounted spraying or misting at night is only conducted at night. Bees are not active at night. The droplets in the spray have an extremely small diameter. The surface to mass ratio of these droplets is such that these droplets do not leave residue on surfaces. They are like tiny parachutes. When they are pulled down by gravity, drag keeps them from falling. The point is that these droplets do not land or stick on surfaces. When bees become active the next day and crawl across surfaces, those services do not have any pesticide from our spray. The droplet size averages 15 micrometers. There are 1000 micrometers in a millimeter. Machines are tested at least twice a year.

ii. Black Flies

Background

Black flies, commonly referred to as buffalo gnats, are the smallest of the blood feeding dipterans. Worldwide, blackflies are responsible for transmitting ochocerciasis (river blindness) to millions of people in tropical areas. Black flies can also vector bovine onchocerciasis, mansonellosis, and leucoytozoonosis, in wild and domestic animals. While generally only considered nuisance pests in the United States, epidemiological research has demonstrated that black flies are competent vectors of vesicular stomatitis and suggest that these pests may be responsible for periodic outbreaks of this disease in livestock, wildlife, and humans, in the western United States. However, flies may also become so abundant as to be drawn into the air passages of livestock, occasionally resulting in death. Black fly feeding activity may also result in allergic reaction in both animals and man as a result of histaminic substances in black fly saliva.

There are approximately 1,800 species of black flies throughout the world with approximately 254

species in North America alone. Black flies can be 1) a source of annoyance to people, animals, and wildlife, 2) a limiting factor in economic development (*e.g.*, residential development and property value), and 3) a causal factor in decreased agricultural productivity (*e.g.*, animal weight loss/death and milk production). Black fly control in the United States provides economic, health, and quality of life benefits. In contrast to the integrated approach used for mosquito control, due to its unique biology, black fly control in the United States is primarily through the use of larvicides.

Part 2.2.1.a -- Identify the Problem

Prior to the first pesticide application covered under this permit that will result in a discharge to State waters, and at least once annually prior to the first pesticide application for each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must do the following for each pest management area. Operators must identify the pest problem in their pest management areas prior to the first application covered under the permit. Knowledge of the pest problem is an important step to developing Pest Management Measures. Re-evaluation of the pest problem is also important to ensure Pest Management Measures are still applicable. Operators must identify the pest problem at least once each calendar year prior to the first application for that calendar year.

Establish densities for larval and adult mosquito or flying insect pest populations or identify environmental condition(s), either current or based on historical data, to serve as action threshold(s) for implementing Pest Management Measures. Operators must develop action thresholds for larval and adult mosquitoes prior to the first pesticide application covered under this permit. The action thresholds must be re-evaluated at least once each calendar year. As noted in the general discussion above, an action threshold is a point at which pest populations or environmental conditions indicate that pest control action must be taken. Action thresholds help determine both the need for control actions and the proper timing of such actions. For example, an action threshold could be the number and distribution of service requests received from the public. It is a predetermined pest level (or other indicator) that is deemed to be unacceptable as described in previous section as determined by MDA. This is especially true when the pest is capable of transmitting a human pathogen (*e.g.*, mosquitoes and the West Nile virus).

Identify the target pest(s) to develop Pest Management Measures based on developmental and behavioral considerations for each pest. Knowledge of the developmental biology of mosquitoes is essential to developing Pest Management Measures for mosquito control. The mosquito undergoes complete metamorphosis and has four distinct stages in its life cycle: egg, larva, pupa, and adult. Depending on the species, eggs are deposited either in permanent water habitats or in temporary/floodwater habitats. Egg deposition in permanent water habitats occurs as individual eggs or as multiple egg rafts deposited directly to the water surface in natural or artificial water-holding containers found in the domestic environment or in naturally occurring pools. Egg rafts may contain 100-200 eggs. A batch laid of single eggs may range from 60-100 eggs. Egg deposition in temporary/floodwater habitats occurs as individual eggs on moist soil (*e.g.*, roadside ditches, depressions, farmland irrigation ditches, etc.) or in other objects (*e.g.*, flower pots, cans, tires, tree holes, etc.) in which periodic flooding will occur. Eggs deposited in permanent habitats will hatch in a few days whereas eggs deposited in temporary/floodwater habitats are resistant to desiccation in the absence of flooding and can withstand drying for extended periods of time (weeks to months) before hatching.

Following egg hatching, typically 2-3 days after laying, mosquitoes go through four larval developmental stages (instars) commonly known as wrigglers. Larval development may be completed in a week or less under ideal conditions but may also take longer depending on the species, geography, and environmental conditions (*e.g.*, crowding, food availability, and water temperature). The first three larval instars continually feed on detritus, algae, bacteria, and fungi. However, some mosquito species are predacious with larva feeding on other mosquitoes and/or small aquatic invertebrates. Late in the fourth larval instar

the larvae ceases to feed in preparation for pupation. The pupal stage, commonly referred to as a tumbler, is a non-feeding developmental stage in which the adult form is developed. Following a few hours to several days, dependent upon species and water temperature, the adult emerges from the pupae.

The adult mosquito is the pestiferous stage. Adults emerge from the water surface and after a short period of rest seek out a food source. Both males and females feed on nectar of flowers and other sugar sources as a source of energy. Only female mosquitoes seek out a blood meal as a source of protein and lipids for egg development. However, females of some species are autogenous (*i.e.*, able to use energy reserves carried over from the immature stage to develop the first egg batch). In addition, most mosquitoes have preferred hosts which may include warm and cold blooded animals and birds. Human blood meals are seldom first or second choices with livestock, smaller mammals and/or birds generally preferred. Host seeking and blood feeding activities by mosquitoes are initiated by a complex variety of host and environmental cues (*e.g.*, carbon dioxide, temperature, moisture, smell, color, movement and host preference). Adult feeding activity is generally either crepuscular (early morning, dusk and into the evening) or diurnal (daytime, particularly in relation to cloudy days and shaded areas). Although highly variable by species and environmental conditions, a complete development cycle can occur every one to three weeks. An understanding of the developmental biology of species in a given area provides the basis for developing Pest Management Measures aimed at reducing pesticide discharges into waters of the United States.

Prior to the first pesticide application covered under the permit, Operators must ensure proper identification of mosquito to better understand the biology of the target pest and develop Pest Management Measures. Due to the great variability in developmental habitats and adult feeding behaviors as discussed previously, proper identification is imperative in designing an effective and efficient Pest Management Measures. Identification of the target pest will aid in development of Pest Management Measures aimed at both the immature and adult developmental stages. Identification of the target pest for a specific area allows 1) identification of potential breeding sites, 2) evaluation of alternative Pest Management Measures aimed at controlling the immature stages (habitat modification, source reduction, larvicides, biological larvicides, and oils), and 3) assessment of potential for disease transmission.

For black flies, the life cycle includes four stages: egg, larva, pupa, and adult. All are aquatic except the adults, which leave the water to search for food and mates. Black fly immatures have three general life history strategies. One group of species produces one generation per year (univoltine) that matures in late winter or early spring. A second group is also univoltine, but these species develop during late spring or summer. The third and final group of species produces two or more generations per year (bivoltine or multivoltine) that typically develop from early summer through fall.

Adult females deposit from 150 to 500 eggs in flowing water. Flowing water habitats capable of black fly production range from a 4-inch trickle to large rivers. Egg-laying occurs near dusk for many species. The eggs are dropped singly from the air or deposited in masses on trailing vegetation, rocks, debris and other substrates. Eggs hatch in two days to eight months, depending on black fly species and water temperature. Incubation time in some species is delayed by a prolonged diapause, or resting period. Eggs of many species can successfully withstand temperature extremes and fluctuating water levels associated with seasonal flood and drought conditions, .Many species overwinter in the egg stage, but a few black flies spend the winter months as larvae and pupae, or rarely, as adults.

Larvae anchor themselves to clean vegetation, rocks, or debris by spinning a small silken pad with their mouthparts and inserting a row of hooks at the end of their enlarged abdomen into the silk pad. This technique allows the larvae to secure themselves in areas of very fast water velocity and orient their body with the abdomen pointed upstream, and head positioned downstream to feed. Larvae can easily relocate to other areas by drifting downstream on a silken thread, spinning a new silk pad, and reattaching

themselves in areas with more acceptable substrates or food supplies. Feeding is accomplished by expanding a pair of fan-like structures on their hardened head capsule to efficiently filter microscopic food particles from the water column. The larvae filter or scrape very fine organic matter, filamentous algae, bacteria and tiny aquatic animals from the current or substrates. Larvae are often infected with various parasites and pathogens, including nematode worms, bacteria, fungi, protozoa and viruses.

Larval instars vary from four to nine, depending on species, with many species passing through an average of seven instars. Larval development time varies from one week to six months depending on species, water temperature, stream turbidity and food availability. Larval growth is very temperature dependent, with relatively slow growth during the cold winter months and very rapid growth during warm summer water temperatures. Some summer-developing, multivoltine species are capable of completing their entire life cycle in just a few weeks. Mature larvae, with fully developed respiratory filaments visible as a dark area on each side of the thorax, stop feeding, and construct a silken pupal cocoon where metamorphosis takes place.

Pupae secure themselves inside their cocoons with rows of spine-like hooks on their abdomen. The tightly woven or loose cocoons, characteristically shaped for each species, are attached to substrates with the closed end facing upstream to protect pupae from current and sediments. Some species have a lateral aperture, or window, on each side of the cocoon to increase water circulation around the pupa. The branched respiratory organs that project from the pupal thorax are designed to function in or out of water. This adaptation allows pupae to obtain oxygen at all times, and survive normal fluctuations in water levels. The pupal stage may last from two days to several weeks depending on the species and water temperature.

Adults emerge from the pupal skin through an elongate slit at the top of the thorax and ride a bubble of air that propels them to the water surface. Freshly emerged adults fly to streamside vegetation where their wings and bodies quickly dry and harden. Mature adults immediately seek food sources and mates. Both sexes feed on nectar, sap, or honeydew to obtain the sugar used for flight and energy. Only females feed on blood. In most species, mating takes place in flight, with females flying into male swarms that form over landmarks such as waterfalls, vegetation or host species. Males utilize their large eyes to detect and seize females entering the swarm. Male and female pairs exit the swarm, and mating takes place in flight in just a few seconds. Females then seek a host to obtain the blood meal required to nourish their eggs. Adults are strong fliers, capable of dispersing many miles from their larval habitats.

Black fly females are attracted to their specific hosts by size, shape, color, carbon dioxide, body odor, body movement, skin texture, temperature and humidity. Females use their mouthparts to cut, or lacerate the host skin, and then drink from the resulting pool of blood. Anticoagulants in the saliva are injected into the bite to facilitate bleeding. Many domestic and wild animals have been killed by outbreaks of adult black flies. Deaths have been attributed to acute toxemia from large numbers of bites, anaphylactic shock, and weakness due to blood loss. In humans, lesions can develop at the bite, accompanied by reddening, itching, and swelling. In severe cases, allergic reactions may occur, resulting in nausea, dizziness, and fever.

Host specificity in black flies varies from highly specific species that will feed on blood from only one host, to much more generalized species that will draw blood from a number of different hosts. Although host preferences for many North American black flies are poorly understood, it is estimated that 67% feed on mammals and 33% feed on birds. Approximately 10% of North American species will feed on the blood of humans.

Prior to first pesticide application covered under this permit, Operators must ensure proper identification of the pest to develop Pest Management Measures. Due to preferred hosts and developmental habitats, proper identification of the pest is instrumental in determining the biology (univoltine or multivoltine),

and developmental habitat preference (*e.g.*, flow rate, stream size, stream substrate composition), and flight range of the target pest. By knowing these factors, a control program can:

1) Determine if the black fly species warrants control activities (*i.e.* Host preference and historical problems),
2) Identify habitats and delineate the potential area for ongoing monitoring and control activities,
3) Determine frequency of site monitoring,
4) Estimate timing for pesticide application (*i.e.* Historical seasonal occurrence, age distribution of susceptible immature population, environmental conditions suitable for control activity, etc.), and
5) Reduce discharge of pesticides into State waters.

Identify known breeding sites for source reduction, larval control program, and habitat management. Once pests have been identified, mapping is a valuable tool in assessing mosquito habitats and designing control programs for a specific area to minimize pesticide discharges into State waters. Maps may simply be township/city/county maps but may also include aerial photo assessments, topographic maps, and satellite imagery where available and/practicable. Mapping is essential to identify pest producing areas which can and cannot be controlled using non-chemical preventative measures (*e.g.*, source reduction). Maps should include all potential sites for mosquito development including agricultural areas in the specific area (*e.g.*, hay, pasture, circle irrigation, orchards, rill irrigated field crops, and flood irrigated pastures and farmland). Mapping should also be a priority in a surveillance program utilizing mosquito traps, biting counts, complaints, and reports from the public. Planning in coordination with mapping ensures the best Pest Management Measures (whether source reduction, biological, or chemical) for each particular pest is chosen. Operators must identify known breeding sites prior to the first pesticide application covered under this permit.

In conjunction with identifying the target pest, mapping should be considered part of control programs aimed at black fly management. As black flies are strong fliers and will travel great distance to obtain a blood meal, mapping should be for an extended area from the site to be protected by control activities. Pest identification and mapping should also be a priority in a surveillance program (both current and historical) to determine the need for initiating control activity. Identification and mapping are both essential to planning a control program which reduces pesticide discharges into State waters.

Analyze existing surveillance data to identify new or unidentified sources of mosquito or flying insect pest problems as well as sites that have recurring pest problems. As discussed above, mapping is a valuable tool in assessing mosquito habitats and designing control programs. Operators must analyze existing surveillance data to identity any new source of pest problems.

In the event there are no data for the pest management area in the past calendar year, use other available data as appropriate. Operators may use historical data or neighboring district data to identify the pest and establish action thresholds.

Part 2.2.1.b -- Pest Management Options

Prior to the first pesticide application covered under this permit that will result in a discharge to State waters, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must select and implement efficient and effective means of Pest Management Measures that minimize discharges resulting from the application of pesticides to control mosquitoes or other flying insect pests. Operators are required to evaluate management options and implement Pest Management Measures to minimize pesticide discharges into State waters prior to the first pesticide application covered under this permit. Operators must reevaluate every year prior to the first pesticide application for that calendar year.

The following describes the management options that must be evaluated.

No Action. No action is to be taken, although a mosquito problem has been identified. This may be appropriate in cases where, for example, available control methods may cause secondary or non-target impacts that are not justified or no control methods exist.

Prevention. Prevention strategies are program activities which eliminate developing mosquito populations through environmental modification and/or habitat management. For mosquito control, these activities are physical methods such as habitat modification, cultural methods that reduce sources of mosquitoes, and biological control.

Mechanical/Physical Methods. Habitat modification, also known as physical or permanent control, is in many cases the most effective mosquito control technique available and is accomplished by eliminating mosquito breeding sites. Habitat modification activities have the potential to be both effective and economical in some areas and can virtually eliminate the need for pesticide use in and adjacent to the affected habitat. However, the ability to use prevention strategies is dependent upon local authority and restrictions.

Cultural Methods. Cultural methods can reduce sources of mosquitoes and can be as simple as properly discarding old containers that hold water capable of producing *Aedes aegypti*, *Ae. albopictus* or *Culex spp*. or as complex as implementing Rotational Impoundment Management (RIM) or Open Marsh Water Management (OMWM) techniques. RIM is a source reduction strategy that controls salt marsh mosquitoes (*e.g.*, *Ae. taeniorhynchus* and *Ae. sollicitans*) at the same time as significant habitat restoration is occurring. Source reduction may include; water management, vegetation management, biological control, and pesticide use in non-waters of the United States.

Containers provide excellent habitats for development of numerous mosquito species. These may include but are not limited to flowerpots, cans, and tires. Container-inhabiting mosquitoes of particular concern include, *Ae. aeypti*, *Ae. albopictus*, *Cx. p. pipiens*, and *Cx. salinarious*. A container-breeding mosquito problem can be solved by properly disposing of such materials, covering them, tipping them over to ensure that they do not collect water, and/or periodic draining. Urban container-breeding mosquito control is best implemented through education and surveillance programs.

Source reduction in freshwater lakes, ponds, and retention areas is more applicable to artificially created areas than natural areas. Artificial ponds can be eliminated as a breeding site simply by filling in the areas, (*i.e.* habitat modification). However, large permanent water bodies and areas for stormwater or wastewater retention require other methods. Options for these areas include minimizing and/or eliminating emergent and standing vegetation, maintenance of steep banks, and inclusion of deep water areas as sanctuary for larvivorous fish.

Mosquito production from stormwater/wastewater habitats can result in considerable mosquito problems as a result of engineering, poor construction or improper maintenance. However, mosquito populations can typically be managed by keeping such areas free of weeds through an aquatic plant management program and maintaining water quality that can support larvivorous fish. *Culex*, *Coquillettidia*, *Mansonia*, and *Anopheles* mosquitoes are often produced in these habitats.

Pastures and agricultural lands are enormous mosquito producers, frequently generating huge broods of *Aedes*, *Psorophora*, and *Culex* mosquitoes. Improved drainage is one effective tool for source reduction in such habitats. The second is the use of efficient, precision irrigation practices that will result in less standing water for those agricultural areas that require artificial watering.

In coastal areas with extensive coastal salt marshes, there can be tremendous production of *Aedes*

mosquitoes, making coastal human habitation virtually impossible. Several source reduction efforts can greatly reduce salt-marsh mosquito production through high-to mid-intensity management that relies upon artificial manipulation of the frequency and duration of inundation.

Biological Control Agents. The use of biological organisms or their byproducts to combat pest insects, such as mosquitoes, is termed biological control, or biocontrol. Biocontrol is utilization of parasites, predators, and pathogens to regulate pest populations. Generally, this definition includes natural and genetically modified organisms and means that the agent must be alive and able to attack the mosquito. The overall premise is simple: Biocontrol agents that attack mosquitoes naturally are grown in the lab and then released into the environment, usually in far greater numbers than they normally occur, and often in habitats that previously were devoid of them, so as to control targeted mosquito species.

One advantage of biocontrol agents is host-specificity which affords minimal disturbance to non-target species and to the environment. However, it is this specificity and the cost of commercializing biocontrol agents that deter development of biocontrol agents. In addition, utilization of biocontrol requires increased capital outlay and start-up costs as well as increased training requirements for personnel. Biocontrol should be considered a set of tools that a mosquito control program can use when it is economically feasible. When combined with conventional chemicals and physical control procedures, biocontrol agents can provide short and, occasionally, long-term control. Biocontrol, as a conventional control method, should aim at the weakest link of the life cycle of the mosquito. In most cases, this is the larval life stage.

Mosquitofish (*Gambusia affinis*) are currently the most extensively used biocontrol agent. These fish, which feed on mosquito larvae, can be placed in a variety of permanent and semi-permanent water habitats. Differences of opinion exist on the utility and actual control benefits derived from *Gambusia* implementation in an integrated pest management program with results reported from excellent control to no control at all. Concerns over placing *Gambusia* in habitats where other fish species assemblages are threatened have been ongoing. Care must be taken in placement of this cosmopolitan species in areas where endemic fish species are sensitive to further environmental perturbation. Additionally, use of endemic fish species in these areas of concern deserves greater attention.

In some aquatic habitats, fish function as an excellent mosquito biocontrol mechanism. These typically are permanent habitats where *Culex* and *Anopheles* are the primary mosquito residents and where the mosquito densities are not excessive. However, in habitats such as salt marshes fish are unable to control the sudden explosion of larvae produced by rainfall or rising tides. Here, the mosquito population numerically exceeds what the fish can consume during the brief immature mosquito developmental period. In salt marshes, fish must rely on things other than mosquito larvae for their nutritional needs most of the time, simply because there may be long delays between hatches of larvae. Mosquito larvae present an abundant food source, but only for a few days during their rapid development.

Species of predacious mosquitoes in the genus *Toxorhynchites* have been studied in a variety of urban areas for control of container-inhabiting mosquitoes, such as the Asian tiger mosquito (*Ae. albopictus*). *Toxorhynchites* mosquitoes also affect mosquito populations that develop in the treehole environment; however, their introduction into urban container habitats has proven unsuccessful. In specific containers, *Toxorhynchites* may consume a large number of prey mosquito larvae, such as *Aedes aegypti* and *Ae. albopictus*. However, this predator does not disperse well enough to impact the vast number of natural and artificial containers used by these mosquitoes. Additionally their life-cycle is two to three times that of their prey making it impossible for them to keep up with the other more rapidly developing mosquitoes. Another group of biocontrol agents with promise for mosquito control is the predacious copepods (very small crustaceans). Copepods can be readily mass reared, are easily delivered to the target sites, and perform well when used with insecticides.

Birds and bats are often promoted as potential biocontrol agents of adult mosquitoes. However, while both predators eat adult mosquitoes, they do not do so in sufficient amounts to impact the mosquito populations. Mosquitoes provide such a small amount of nutrition that birds or bats expel more energy pursuing and eating mosquitoes than they derive from them. They are not a primary food source for these predators. Additionally, with mosquito flight behavior being crepuscular they are not active during the feeding periods of most birds. While bats are active during the correct time period, they simply cannot impact the massive numbers of adult mosquitoes available.

Bio-rational products exploit insecticidal toxins found in certain naturally occurring bacteria. These bacteria are cultured in mass and packaged in various formulations. The bacteria must be ingested by mosquito larvae so the toxin is released. Therefore bio-rational products are only effective against larvae since pupae do not feed. The bacteria used to control mosquito larvae have no significant effects on non-target organisms. The possibility of creating a new invasive species by the introduction of biocontrols should be considered, evaluated, and avoided.

Pesticides. There are chemical and biological pesticide products registered for use against mosquitoes. Two biological pesticide products that are used against mosquito larvae singly or in combination are *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus* (Bs).

Manufactured Bti contains dead bacteria and remains effective in the water for 24 to 48 hours; some slow release formulations provide longer control. In contrast, Bs products contain live bacteria that in favorable conditions remain effective for more than 30 days. Both products are safe enough to be used in water that is consumed by humans. In addition to the biological pesticides, there are chemical pesticides for use against mosquitoes. As described below, once the determination is made to use pesticides to control mosquitoes, additional requirements under the 2016 PGP must be met.

Part 2.2.1.c. -- Pesticide Use

Conduct larval and/or adult surveillance in an area that is representative of the pest problem or evaluate existing larval surveillance data, environmental conditions, or data from adjacent area prior to each pesticide application to assess the pest management area and to determine when action threshold(s) is met. Pest surveillance is important for timing pest control properly and to evaluate the potential need for pesticide use for mosquito control. Understanding surveillance data may enable mosquito control Operators to more effectively target their control efforts. Operators are required to conduct a surveillance program to minimize discharges from control activities. Surveillance is necessary not only to establish pests' presence and abundance but also as an evaluation tool of the effectiveness of source reduction and chemical control activities. Furthermore, surveillance should be used as an indicator of the need for additional chemical control activities based on pre-established criteria related to population densities in local areas.

Larval surveillance involves routine sampling of aquatic habitats for developing mosquitoes. The primary tools used to determine larval densities and species composition are a calibrated dip cup and/or a bulb syringe for inaccessible areas such as treeholes. The counts may be expressed as the number of immature (larvae and pupae) mosquitoes per dip, per unit volume, or per unit surface area of the site. However, due to natural mortality from environmental factors, disease and predators, larval dip counts do not provide an accurate indication of the potential adult population. Nevertheless, larval counts do indicate when chemical larval control measures are warranted.

Adult surveillance is a key component of Pest Management Measures. Adult surveillance can be conducted using a variety of methods including but not limited to CDC traps, New Jersey light traps, resting site traps, egg oviposition traps, vehicle traps, and landing count rates. Mosquito control Operators should use a variety of the available traps as adults are attracted to different traps depending

on their species, sex, and physiological condition. Trapped adults provide information about local species composition, distribution, and density. In addition, the need for adulticide application may also be established through the number and distribution of service requests received from the public. Collection data also provide feedback to the mapping and planning component of the integrated pest management program as well as to its effectiveness and also serve to identify new sources of mosquitoes or identify recurring problem sites.

Disease surveillance, where practical, is also a key component of Pest Management Measures. Detecting antibodies in "sentinel" chicken flocks, equine cases, and testing dead birds and adult mosquitoes for infections are all used to determine whether disease is being transmitted in an area. Mosquito and vector control agencies also may test mosquitoes for viruses in their laboratories. Although generally less sensitive than sentinel chickens, mosquito infections may be detected earlier in the season than chicken seroconversions and therefore provide an early warning of virus activity. However, disease surveillance is not applicable to all mosquito control programs. In the absence of a dedicated disease surveillance program, mosquito control Operators should stay informed of arboviral occurrence or potential for occurrence in their control areas as determined by local, state, and/or national public health agencies.

Larval surveillance involves routine sampling of aquatic habitats for developing black flies. Larval surveillance is primarily accomplished by collecting stream substrates (rocks, vegetation, etc.) and examining for larval and pupal occurrence. Due to the varied developmental sites for black larvae and their ability to move in streams relative to changes in flow patterns, quantitative sampling will vary from site to site and in many instances, particularly with continuously changing water levels, is not practical. Qualitative sampling is often used in lieu of quantitative sampling, as an indicator of egg hatch and to indicate the age distribution of developing larvae. Qualitative sampling alone when used in conjunction with historical occurrence data can provide a reliable indicator of the need to initiate control activities.

Adult surveillance for black flies may include sweep sampling, vacuum aspiration of adults, and the use of silhouette traps. Traps may be simple visual attractants or may be baited with artificial attractants (*e.g.*, ocentol and CO_2). However, as different black fly species will respond differently in relation to different attractants, based on host preference, care must be used in selecting attractants that will provide a representative sample of the complete black fly spectrum present in any given location. Choice of adult sampling will in many cases be dictated by historical occurrence of black flies in a given area. Regardless, surveillance data is a useful tool in providing feedback to the mapping and planning component of any Pest Management Measure.

Aside from surveillance data, Operators may also evaluate environmental conditions to assess the pest management area. For example, if the pest management area is known for pest development after flooding then Pest Management Measures may be needed after a rain storm.

Reduce the impact on the environment and on non-target organisms by applying the pesticide only when the action threshold(s) has been met. Operators must apply pesticide only as indicated by action thresholds for the pest management area. Timing pesticide application can reduce the impact on the environment and on non-target organisms.

In situations or locations where practicable and feasible for efficacious control, use larvicides as a preferred pesticide for mosquito or flying insect pest control when the larval action threshold(s) has been met. Operators may use larvicides, adulticides or a combination of both. However, when practicable and feasible, larviciding should be the primary method for mosquito control. Larviciding is a general term for the process of killing mosquitoes by applying natural agents or manmade pesticide products designed to control larvae and pupae (collectively called larvicides) to aquatic habitats. Larviciding uses a variety of equipment, including aerial, from boats, and on the ground, as necessitated by the wide range of breeding habitats, target species, and budgetary constraints. Applications can be

made using high pressure sprayers, ULV sprayers, handheld sprayers, and back sprayers. However, larviciding is only effective when a high percentage of the mosquito production sites are regularly treated, which may be difficult and expensive.

There are advantages and disadvantages to aerial and ground larvicide applications. Ground larviciding allows application to the actual treatment area and consequently to only those micro-habitats where larvae are present. Therefore, ground larviciding reduces unnecessary pesticide load on the environment. However, ground applications often rely on in-the-field human estimates of the size of treatment areas and equipment output with a greater chance of overdosing or under-dosing. Ground larviciding is also impractical for large or densely wooded areas and exposes Applicators to greater risk of insecticide exposure.

Aerial larviciding application methods are generally used for controlling mosquito larvae present in large areas and areas that are inaccessible for ground application. However, failure to treat an entire area with good larvicide coverage can result in the emergence of large adult populations. In order to prevent poor site coverage, a global positioning system (GPS), where economically feasible, or site flagging are necessary to increase accuracy of the pesticide application coverage while minimizing the amount of larvicides being applied. Aerial application does provide easier calibration of equipment due to the fact that the target area is generally mapped and the material is weighed or measured when loading. However, cost of aerial application is higher than ground application (*i.e.* additional personnel for flagging or expensive electronic guidance systems) and also requires special FAA licenses, training of staff, and additional liability insurance. In addition, aerial larviciding has greater potential for non-target impacts.

Bacillus thuringiensis var israelensis (Bti) is the primary larvicide used for black fly control in the United States. Bti is a gram positive, aerobic, spore-forming bacterium that produces protoxins in the form of parasporal protein crystals. In the alkaline digestive tract of black flies and mosquitoes, the protoxins become activated into highly toxic delta-endotoxins. The endotoxins cause a rapid breakdown in the lining of the mid-gut and necrosis of skeletal muscles, resulting in paralysis and mortality of target insect pests. Bti is nontoxic to most non-target organisms due to their acidic digestive systems and lack of suitable tissue receptor sites.

To minimize pesticide discharges into State waters, Operators must apply larvicides as needed for source reduction as indicated by the action threshold in situations or locations where it is practicable and feasible to do so. The action threshold may be based on occurrence of adults (current or historical) and/or larval sampling of stream substrates for immature black flies. Surveillance is also a valuable tool for assessing the effectiveness of larval control activities.

Larvicides may be applied to streams using either ground or aerial equipment. Choice of equipment is largely dictated by stream size and accessibility. Application equipment may include backpack sprayers, boats equipped with sprayers or metered release systems, helicopters or fixed wing aircraft. The amount of insecticide required to treat a stream should be based on the desired dosage and the stream discharge. Stream discharge is calculated by determining the average width and depth of the stream and the stream velocity (discharge = width (m) x depth (m) x velocity (m/s)). Proper calibration of insecticide delivery based on discharge is necessary to ensure complete coverage throughout the water column in order to expose all larval habitats to an effective insecticide dose.

A larvicide is applied across the stream width for the time specified by the application rate. The point of application should be far enough upstream from the larval habitat to ensure proper insecticide dispersal in the water passing over the treatment area. Operators should determine the effective downstream carry (maximum distance at which at least 80% larval control is achieved) of the insecticide suspension. By determining downstream carry, black fly control Operators can limit the number of applications necessary to treat any given stream and thereby reduce pesticide discharges into State waters.

In situations or locations where larvicide use is not practicable or feasible for efficacious control, use adulticides for mosquito or flying insect pest control when the adult action threshold(s) has been met. Chemical pesticide applications for adult mosquitoes (adulticiding) are the most visible and commonly used form of mosquito control. Adulticide applications may be used for nuisance or disease vectoring mosquitoes. Adulticiding consists of dispersing an insecticide as a space spray into the air column, using ground or aerial equipment, which then remains suspended in the air column through the habitat where adult mosquitoes are flying. Any mosquito adulticiding activity that does not follow reasonable guidelines, including timing of applications, avoidance of sensitive areas, and strict adherence to the pesticide label, risks affecting non-target insect species.

Operators must ensure that the adulticide applications are made only when necessary by determining a need in accordance with specific criteria that demonstrate a potential for a mosquito-borne disease outbreak or numbers of disease vector mosquitoes sufficient for disease transmission, or a quantifiable increase in numbers of pestiferous mosquitoes. To determine the need for adulticide application, at least one of the following criteria should be met and documented by records: 1) when a large population of adult mosquitoes is demonstrated by either a quantifiable increase in, or a sustained elevated mosquito population level as detected by standard surveillance methods, 2) where adult mosquito populations build to levels exceeding community standards (*e.g.*, 25 mosquitoes per trap night or 5 mosquitoes per trap hour during crepuscular periods), and/or 3) when service requests for arthropod control from the public have been confirmed by one or more recognized surveillance methods.

The most common forms of adulticiding are ultra-low volume spray (ULV) and thermal fogging. Ground adulticiding is almost exclusively conducted with ULV equipment and is the most common method used to control mosquitoes. Ground adulticiding can be a very effective technique for controlling most mosquito species in residential areas with negligible non-target effects.

Aerial adulticiding is a very effective means of controlling adult mosquitoes, particularly in inaccessible areas, and may be the only means of covering a very large area quickly in case of severe mosquito outbreaks or vector borne disease epidemics. Aerial adulticide applications are made using either fixed wing aircraft or rotor craft. Application is generally as ULV spray but some thermal fogging still occurs.

Adulticide application has its own set of conditions that determine success or failure. The application must be at a dosage rate that is lethal to the target insect and applied with the correct droplet size. Whether the pesticide application is ground or aerially applied, it must distribute sufficient insecticide to cover the prescribed area with an effective dose. Typically with ground applications, vegetated habitats may require up to three times the dosage rates that open areas require. This is purely a function of wind movement and its ability to sufficiently carry droplets to penetrate foliage. In addition, aerial application is dependent upon favorable weather conditions.

Environmental conditions may also affect the results of adulticide application. Wind determines how the ULV droplets will be moved from the output into the treatment area. Conditions of no wind will result in the material not moving from the application point. High wind, a condition that inhibits mosquito activity, will quickly disperse the insecticide over too wide an area but at a diluted rate too low to effectively control pests. Light wind conditions (< 10 mph) are the most desirable because they move the material through the treatment area and are less inhibiting to mosquito activity. Thermal fogs perform best under very light wind conditions.

ULV application should be avoided during hot daylight hours. Thermal conditions, particularly temperature inversion, will cause the small droplets to quickly rise, moving them away from mosquito habitats. Generally, applications are made after sunset and before sunrise, depending upon mosquito species activity. Some mosquitoes (*Culex* and *Anopheles*) are most active several hours after sunset, while others (*Ae*. *aegypti* and *Ae*. *albopictus*) are more active during the daytime, and if these species

are the targets, application should be made during the period of highest activity for the target species, provided that meteorological conditions are suitable for application (seldom during daylight hours).

One notable exception to applications made when mosquitoes are up and flying is a residual barrier treatment application. Barrier applications are based on the natural history and behavioral characteristics of the mosquito species causing the problem. Barrier applications use a residual material and are generally applied with a powered backpack sprayer to preferred resting areas and migratory stops in order to intercept adult mosquitoes hunting for blood meals. Barrier applications are often applied during daylight hours as a large-droplet liquid application and are designed to prevent a rapid re-infestation of specific areas, such as recreational areas, parks, special-event areas, and private residences. Barrier applications can help provide control of nuisance mosquitoes for up to one week or longer.

Pesticide control of black flies in the United States historically relied upon both larvicides and adulticides. However, adulticide use against black fly populations is no longer a common practice. As adult black flies are seeking blood meals during the daytime, adulticide application coincides with human activity, so daytime application is no longer a standard control procedure. One reason for this change is due to environmental factors associated with daytime adulticide application, particularly thermal inversions, which cause adulticide application for black fly control to be ineffective. Furthermore, as only adults directly contacted by the adulticide application are killed, with no residual activity against other adults immigrating to the treatment area, adulticide applications are both ineffective and expensive. For these reasons, larvicides which target the immature stages before development of the pestiferous adult are now the primary means of black fly control in the United States.

2.2.2. Weed and Algae Pest Control

Background

Weeds and algae that negatively affect aquatic biodiversity, human health, and economic stability are considered to be pests. Weeds and algae can decrease populations of native aquatic species including threatened and endangered species. Weeds and algae can reduce aquatic biodiversity by preventing desirable species growth and unbalancing desirable aquatic species populations and development. Social, economic, and human health are all affected by a lower aesthetic appeal of water bodies, an increased cost of agricultural irrigation water, and an increase in the risk of human diseases, by providing ideal vector breeding grounds. In addition, the reduction in the utility of water can have social and economic impacts due to reduced hydroelectric operations, impeded opportunity for recreational activities (*e.g.*, fishing, boating, and swimming), and disruption of water transport (*e.g.*, agricultural irrigation), to name a few. As a result, if weeds and algae become established and impede the environmental stability and use goals for a body of water, control measures will be necessary. Pest control may be necessary before the pests become established.

The requirements in this section apply to pesticide discharges associated with management of weeds, algae, and plant pathogens in water and water's edge (including near the water), including ditches and/or canals. Most aquatic plants and algae are largely beneficial to water quality, especially when present in the appropriate densities. However, overabundant native algae and aquatic vegetation, as well as introduced, exotic species, can decrease water quality and utility. Dense plant or algae growth can interfere with recreational activities (*e.g.*, fishing, boating, and swimming), disrupt water transport, reduce aquatic biodiversity by preventing desirable plant growth and unbalancing fish populations, lower the aesthetic appeal of a water body, and increase the risk of human diseases by providing ideal vector breeding grounds.

Algae

Algae are non-vascular plants that do not have true roots, stems, leaves, or vascular tissue, and have simple reproductive systems. Some macroscopic algae may resemble a plant in appearance. Algae may occur in the sea or freshwater. Algae are an important aquatic food source for many animals. However, excess algae growth such as algae blooms, frequently caused by unbalanced or elevated nutrients, can be damaging to aquatic ecosystems. Control options include mechanical, biological, and chemical methods.

Weeds

Weeds, include floating, emergent, or submerged plants negatively impact the quality and utility of waters of the United States. Weeds also include unwanted vegetation, including invasive species, at water's edge, including near the water and vegetation in or near waters of the United States that are not always "wet" (*e.g.*, ephemeral streams, seasonal waters). Aquatic systems need plant materials as an important part of the systems ecology; however, when vegetation becomes established to the point of impeding the use goals for a body of water, control measures become necessary. As a part of such aquatic weed control programs Pest Management Measures should consider mechanical, biological, and/or chemical controls. Details for developing an aquatic weed pest management measures can be found in the document *Aquatic Plant Management, Best Management Practices in Support of Fish and Wildlife Habitat* (Getsinger et al. 2005).

The appropriate type of control for weeds and algae is dictated by the biology of the target species and by environmental conditions and concerns for a specific area. Numerous Pest Management Measures are used to reduce the impact of weeds and algae, but an integrated pest management plan should be the basis for any pest control program. This is a comprehensive approach for managing pest populations using a variety of control methods.

Plant Pathogens

Plant pathogens are microorganisms that cause plant disease. Plant pathogens can be fungi, bacteria, viruses, mycoplasmas, or nematodes. Each has a different life cycle which includes an infectious stage. Most pathogens are host-specific to a particular plant species, genus, or family. Some diseases, such as the powdery mildews, produce similar symptoms on different plants. However, the fungi involved are usually host-specific. (Ohio State University Extension)

Fungi is one group of plant pathogens. They cause plant diseases such as rusts, smuts, and mildews. Fungal spores may be actively or passively released for dispersal by several effective methods (air dispersal, rain splash, flowing water dispersal, and forcible release). The function of some spores is not primarily for dispersal, but to allow the organisms to survive as resistant cells during periods when the conditions of the environment are not conducive to growth. Most phyla are terrestrial in origin, although all major groups have invaded marine and freshwater habitats. Wherever adequate moisture, temperature, and organic substrates are available, fungi are present. Although we normally think of fungi as growing in warm, moist forests, many species occur in habitats that are cold, periodically arid, or otherwise seemingly inhospitable. It is important to recognize that optimum conditions for growth and reproduction vary widely with fungal species. Fungi can be controlled using chemical, biological, and cultural practices.

Bacteria are single celled organisms that can cause many plant diseases (such as fire-blight, canker, and leaf spots). The infected plant can suffer significant yield losses or die prematurely. Bacterial diseases can be managed by chemical, biological, or cultural practices.

Nematodes are simple, multi-cellular organisms that look like worms. They are soft-bodied (no skeleton)

non-segmented round worms. Most nematode species that attack plants are microscopic. Plant parasitic nematodes may attack the roots, stem, foliage, and flowers of plants. Nematodes can be controlled by chemical, physical, or biological methods.

Part 2.2.2.a -- Identify the Problem

Prior to the first pesticide application covered under this permit that will result in a discharge to State waters, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must do the following for each pest management area. Operators must identify the pest problem in their pest management area prior to the first application covered under this permit. Knowledge of the pest problem is an important step to developing Pest Management Measures. Re-evaluation of the pest problem is also important to ensure Pest Management Measures are still applicable. Operators must identify the pest problem at least once each calendar year prior to the first application for that calendar year.

Identify areas with pest problems and characterize the extent of the problems, including, for example, water use goals not attained (e.g. wildlife habitat, fisheries, vegetation, and recreation). Operators must be well-acquainted with the unique regional conditions of their sites and available Pest Management Measures for controlling the pest present. Intended use goals for the water bodies that are being impeded because of nuisance pest infestation must also be considered based on the control site. The use of the best available mapping information to aid in identifying the problem areas is suggested. Mapping may include aerial photo assessments, topographic maps, and satellite imagery, where available and/or practicable. Mapping can be essential to identify problem areas which can and cannot be controlled using non-pesticide preventative measures (*e.g.*, mechanical control). Mapping can also be used in plotting the regional target pest, as well as water use goals and complaints or reports of weeds and algae from the public.

Identify target pest(s). Positive identification of the pest is required because many pests within the same genera may require different levels and types of Pest Management Measures. Pest identification is important when determining the best Pest Management Measures for each pest and for determining application areas. Operators should develop Pest Management Measures based on identification of the targeted pest which occur in their area.

Identify possible factors causing or contributing to the pest problem (e.g., nutrients, invasive species, etc.). While there may not be reasonable means to control and/or stop the introduction and occurrence of some nuisance pest infestations, the identification of possible sources (*e.g.*, outflows from other water systems/bodies) may help in reducing the need for pesticide. Potential weed and algae causes such as changes in nutrient levels or accidental or intentional introduction of exotic species must be identified.

Establish any pest- and site-specific action threshold. Any data and/or information regarding pest can be used to establish an action threshold. An action threshold must be established.

In the event there are no data for the pest management area in the past calendar year, use other available data as appropriate. Decision-makers may use historical data or neighboring district data to identify the pest and establish action thresholds.

Part 2.2.2.b -- Pest Management Options

Prior to the first pesticide application covered under this permit that will result in a discharge to waters of the United States, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold

must select and implement efficient and effective means of Pest Management Measures that minimize discharges resulting from the application of pesticides to control pests. Operators must evaluate management options and implement Pest Management Measures to minimize pesticide discharges into State waters prior to the first pesticide application covered under this permit. Combinations of various management options are frequently the most effective Pest Management Measures over the long term. The goal should be to emphasize long-term control rather than a temporary fix. Operators must reevaluate every year prior to the first pesticide application for that calendar year. All Pest Management Measures must be implemented in a manner that reduces impacts to non-target species. The following describes the management options that must be evaluated.

No Action - No action is to be taken, although pest problem has been identified. This may be appropriate in cases where, for example, available pest management options may cause secondary or non-target impacts that are not justified, no available controls exist, or the pest population is stable at a level that does not impair water body uses.

Prevention - Preventing introductions of possible pest is the most efficient way to reduce the threat of nuisance species. Identifying primary pathways of introduction and actions to cut off those pathways is essential to prevention. Through a better understanding of the transportation and introduction of pest, private entities (aquaculture) and the public have the necessary knowledge to assist in local pest control by reducing conditions that encourage the spread of pests in their immediate surroundings. For example, recreational water users provide a pathway of unintentional introductions. Increasing public awareness of weeds and algae, their impacts, and what individuals can do to prevent their introduction and spread is critical for prevention. Other examples of prevention include: better design of water holding sites, better management and maintenance of potential problem sites, and volunteer removal of pest (e.g., hand weeding). Monitoring and detection also play important roles in the prevention of the spread and introduction of weeds and algae.

Mechanical or Physical Methods - Mechanical control techniques will vary depending on the pest. Examples include dewatering, pressure washing, abrasive scrubbing, and weed removal by hand or machine. Mechanical and biological controls will be the appropriate method in some cases, or a part of a combination of methods. In some instances, the need for chemical pesticide use in and adjacent to the affected habitat can be reduced or virtually eliminated with proper execution of Pest Management Measures.

Cultural Methods - Cultural techniques include the use of pond dyes and water-level drawdown. The use of certain pond dyes may help manage filamentous algae and submersed (underwater) vegetation. Several pond colorants and one or two dyes are EPA-registered for weed control. Pond dyes and colorants can be effective if there is little water outflow from the pond. Dyes and colorants intercept sunlight needed by algae and other underwater plants for photosynthesis. Therefore, they are generally ineffective on floating plants like duckweed and water lilies and emergent (growing above the surface) plants like cattails and bulrushes. Dyes and colorants are nontoxic and do not kill the plants, and they are safe for use in ponds for irrigation, fishing, and livestock. However, they are not intended for use in large lakes with a lot of water flow or lakes used for public water supplies.

Biological Control Agents - Biological control of weeds and algae may be achieved through the introduction of diseases, predators, or parasites. While biological controls generally have limited application for control of weeds and algae, Operators should fully consider this option in evaluating pest management options.

Pesticides - Aquatic herbicides are chemicals specifically formulated for use in water to kill or control aquatic plants. Aquatic herbicides are sprayed directly onto floating or emergent aquatic plants as well as plants at or near the water's edge or are applied to the water in either a liquid or pellet form. Systemic

herbicides are capable of killing the entire plant. Contact herbicides cause the parts of the plant in contact with the herbicide to die back, leaving the roots alive and able to re-grow. Non-selective, broad spectrum herbicides will generally affect all plants that they come in contact with. Selective herbicides will affect only some plants.

Part 2.2.2.c. -- Pesticide Use

Conduct surveillance in an area that is representative of the pest problem prior to each pesticide application to assess the pest management area and to determine when the action threshold(s) is met. Often, each weed and algae and pest management area warrants different Pest Management Measures tailored to regional conditions. The Pest Management Measures should consist of combinations of mechanical, biological, and/or pesticidal control methods. All Pest Management Measures must be conducted in a manner that minimizes impacts to non-target species.

Decision-makers should apply chemical pesticides only after considering the alternatives and determining those alternatives not to be appropriate Pest Management Measures. Also, Decision-makers should conduct surveillance (*e.g.*, pest counts or area survey) prior to application of pesticides to determine when the action threshold is met thus necessitating the need for implementing Pest Management Measures.

Reduce the impact on the environment and non-target organisms by applying the pesticide only when the action threshold has been met. Operators must apply pesticide only as indicated by action thresholds for the pest management area. As noted above, action thresholds help determine both the need to implement Pest Management Measures and the proper timing of such actions. Timing pesticide application can reduce the impact on the environment and on non-target organisms.

Environmental factors such as temperature and dissolved oxygen content, as well as biological factors such as stage of growth, should be considered when deciding on application timing. Partial site pesticide applications over time may be considered to reduce risk. Pesticide application must be limited to the appropriate amount required to control the target pests. Methods used in applying pesticides must reduce the impact to non-target species.

2.2.3. Animal Pest Control

Background

Animal Pests, such as fish, lampreys, and mollusks, negatively affect aquatic biodiversity, human health, and economic stability. Aquatic nuisance animals decrease populations of native aquatic species including threatened and endangered species. Aquatic nuisance animals can reduce aquatic biodiversity by preventing desirable species growth and unbalancing desirable aquatic species populations and development. Social, economic, and human health are all affected by a lower aesthetic appeal of water bodies, an increased cost of agricultural irrigation water, and an increase in the risk of human diseases by providing ideal vector breeding grounds. In addition, the reduction in the utility of water can have social and economic impacts due to reduced hydroelectric operations, impeded opportunity for recreational activities (*e.g.*, fishing, boating, and swimming), and disruption of water transport (*e.g.*, agricultural irrigation), to name a few. As a result, if or when animal pests become established and impede the environmental stability and use goals for a body of water, implementation of Pest Management Measures will become necessary. Animal aquatic pests also include insects, amphibians, and other animals that spend part or all of their life cycle at water's edge, including near the water, as well as in or

near State waters that are not always "wet" (*e.g.*, ephemeral streams, seasonal waters).

The requirements in this Part apply to pesticide discharges associated with the management of animal pests including fish, lampreys, insects, mollusks, and microorganisms. Animal pest control includes management of nuisance species in waters of the United States, including lakes, ponds, rivers, estuaries, and streams. Pest Management Measures for animal pest control should consider mechanical, biological, and chemical controls.

Fish

Reasons for applications of piscicides in State waters for controlling nuisance species of fish may include, but are not limited to, restoration of threatened and endangered species; fish population management; restoration of native species; control of invasive species; and aquaculture. Pest Management Measures for fish should consider mechanical, biological, and chemical controls.

Lampreys

There are approximately 40 species of lamprey, which are aquatic vertebrates. The sea lamprey is an example of a problematic non-native parasitic species that feeds on native fish species in United States waters. Lampreys may be managed using lampricides that are applied directly to State waters. Several effective management techniques such as mechanical and biological methods are available for lamprey control in addition to lampricides and should be considered when developing Pest Management Measures.

Mollusks

Nuisance mollusks including, but not limited to, zebra and quagga mussels, may cause damage to freshwater ecosystems, degrade drinking water, clog water-intake/discharge pipes for utilities and industries, and negatively impact commercial and recreational activities. Use of molluscicides is one of several methods of control for these aquatic nuisance animals; however, it is important to consider the impacts of mechanical, biological, and/or chemical pesticide use for control of mussels and other aquatic nuisance mollusk species.

Other Animals

There may be animals of concern in addition to fish, lampreys, and mollusks. Control of other animals including, but not limited to, crustaceans, amphibians, or insects found to be a nuisance and requiring management with mechanical, biological, and/or chemical pesticides are included in the requirements in this section.

The appropriate type of Pest Management Measures for animal pests is dictated by the biology of the target pest and by environmental conditions and concerns for a specific area. Numerous Pest Management Measures are used to reduce the impact of animal pests, but integrated pest management should be the basis for any pest control program.

Part 2.2.3.a -- Identify the Problem

Prior to the first pesticide application covered under this permit that will result in a discharge to waters of the United States, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must do the following for each pest management area. Operators must identify the pest problem in their pest management area prior to the first application covered under this permit. Knowledge of the

pest problem is an important step to developing Pest Management Measures. Re-evaluation of the pest problem is also important to ensure Pest Management Measures are still applicable. Operators must identify the pest problem at least once each calendar year prior to the first application for that calendar year.

Identify areas with pest problems and characterize the extent of the problems, including, for example, water use goals not attained (e.g. wildlife habitat, fisheries, vegetation, and recreation). Operators must be well-acquainted with the unique regional conditions of their sites and available Pest Management Measures for controlling the pest present. Intended use goals for the water bodies that are being impeded because of nuisance pest infestation must also be considered based on the control site.

The use of the best available mapping information to aid in identifying the problem areas is suggested. Mapping may include aerial photo assessments, topographic maps, and satellite imagery where available and/or practicable. Mapping can be essential to identify problem areas which can and cannot be controlled using non-pesticide preventative measures (*e.g.*, mechanical control). Mapping can also be used in plotting the regional distribution of desired aquatic species, as well as water use goals and complaints or reports of pests from the public.

Identify target pest(s). Positive identification of the pest is required because many pest within the same genus may require different levels and types of Pest Management Measures. Animal identification is important when determining the best Pest Management Measures for each particular pest and for determining application areas. Operators must develop Pest Management Measures based on identification of the targeted pest which occur in their area.

Identify possible factors causing or contributing to the problem (e.g., nutrients, invasive species). While there may not be reasonable means to control and/or stop the introduction and occurrence of some pest infestations, the identification of possible sources (*e.g.*, outflows from other water systems/bodies) may help in minimizing the need for implementing Pest Management Measures. Potential factors which could lead to the establishment of animal populations such as accidental or intentional introduction of exotic species must be identified before Pest Management Measures are implemented.

Establish any pest- and site-specific action threshold. An action threshold should be established before implementing Pest Management Measures. Any data and/or information regarding pest can serve as an action threshold.

In the event there are no data for the pest management area in the past calendar year, use other available data as appropriate. Operators may use historical data or neighboring district data to identify the pest and establish action thresholds.

Part 2.2.3.b -- Pest Management Options

Prior to the first pesticide application covered under this permit that will result in a discharge to waters of the United States, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must select and implement efficient and effective means of Pest Management Measures that minimize discharges resulting from the application of pesticides to control pests. Operators are required to evaluate management options and implement Pest Management Measures to minimize pesticide discharges into State waters prior to the first pesticide application covered under this permit. Combinations of various management options are frequently the most effective Pest Management Measures over the long term. The goal should be to emphasize long-term control rather than a temporary fix. Operators must reevaluate every year prior to the first pesticide application for that calendar year. All Pest Management Measures must be conducted in a manner that minimizes impacts to non-target

species. The following describes the management options that must be evaluated.

No Action - No action is to be taken, although an animal pest problem has been identified. This may be appropriate in cases where, for example, available control methods may cause secondary or non-target impacts that are not justified or no available controls exist.

Prevention - Identifying primary pathways of introduction and actions to cut off those pathways is essential to prevention. Through a better understanding of the transportation and introduction of animals, private entities (aquaculturists) and the public have the necessary knowledge to assist in local animal control by reducing conditions that encourage the spread of animals in their immediate surroundings. For example, recreational water users provide a pathway of unintentional introductions. Increasing public awareness of pests, their impacts, and what individuals can do to prevent their introduction and spread is critical for prevention. Other examples of prevention include: better design of water holding sites, better management and maintenance of potential problem sites, and volunteer removal of pest species (e.g., fishing). Monitoring and detection also play important roles in the prevention of the spread and introduction of pests.

Mechanical or Physical Methods - Mechanical and biological controls will be the appropriate methods in some cases of pest control, or a part of a combination of methods. Mechanical control techniques will vary depending on the pest. Examples include fishing, dewatering, netting, electrofishing, pressure washing, use of electric fences, and abrasive scrubbing.

Biological Control Agents - Biological control of animals may be achieved through the introduction of diseases, predators, or parasites. While biological control generally has limited application for control of animals, Operators should fully consider this option.

Pesticides - Chemical and biological pesticides such as lampricides, molluscides, insecticides, and piscicides, are registered for use to control animal pests. These pesticides are specifically formulated for use in water where aquatic nuisance animals occur. In some cases, pesticide use may impact non-target species. As described below, once the determination is made to use pesticides, additional requirements must be met.

Part 2.2.3.c. -- Pesticide Use

Conduct surveillance in an area that is representative of the pest problem prior to each application to assess the pest management area and to determine when the action threshold(s) is met. Often, each animal and pest management area warrants different Pest Management Measures, tailored to the regional conditions. Pest Management Measures should consist of combinations of mechanical, biological, and/or pesticidal control methods. All Pest Management Measures must be conducted in a manner that minimizes impacts to non-target species.

Operators must apply chemical pesticides only after considering the alternatives and determining those alternatives not to be appropriate Pest Management Measures. In some instances, the need for chemical pesticide use in and adjacent to the affected habitat can be reduced or virtually eliminated with proper execution of alternative strategies and best management practices. If pesticides are used, they must only be used as needed as determined by an action threshold and Pest Management Measures must be implemented, including use of the minimum effective application rate. Also, Operators must conduct surveillance (*e.g.*, pest counts or area survey) prior to application of pesticides to determine when the action threshold is met that necessitates the need for implementing Pest Management Measures.

Reduce the impact on the environment and non-target organisms by evaluating site restrictions, application timing, and application method in addition to applying the pesticide only when the

action threshold(s) has been met. The pest and site restrictions (water use, water movement, etc.) must be identified when choosing an appropriate pesticide. Environmental factors such as temperature as well as biological factors such as migration timing should be considered when deciding on application timing. Partial site pesticide applications over time may be considered to minimize risk to non-target organisms.

Pesticide application must be limited to the appropriate amount required to control the target pests. Methods used in applying pesticides must minimize the impact to non-target species. For piscicides, chemical deactivation is currently required for all lotic (flowing water) environments. Management agencies typically work downstream throughout the watershed in consecutive treatments as this will require the least amount of chemical deactivation. Most invertebrates repopulate treated areas through immigration (typically in the direction of flow); as such headwater streams/tributaries seem to be effective at accomplishing this. Not all piscicides are that harmful to invertebrate populations (*e.g.*, antimycin is more selective for scaled fish). It can be difficult to know the point at which headwater streams are "fishless"; however, most fishery management agencies do not treat streams unless they are considered a refuge for target species.

2.2.4. Forest Canopy Pest Control

Background

The forest canopy is the uppermost level of the forest. It is composed of treetops, or the crowns of the trees. It provides habitat for animals and plants, some of whom live their entire lives in the canopy. Pests that threaten the health of the forest canopy must be controlled to maintain forest health. Forest canopy pest control programs are designed to integrate environment-friendly Pest Management Measures (*e.g.*, sterile insect release, pheromone trapping, mating disruption, etc.) to reduce losses and pesticide use. But pesticide applications may aerially blanket large tracts of terrain to control an entire population of pests within a delimited geographic area. Forest canopies may also include the tops or crowns of immature trees, where pesticide application is necessary to control pests that live in or threaten these areas.

Forest canopy pest control programs included in this permit are treetop pesticide applications that may inadvertently expose State waters to direct, but limited, pesticide application. Forest canopy pest control can be directed at a variety of pests, but primarily insects. Forest canopy pest control programs are utilized to prevent habitat elimination/modification, economic losses (*e.g.*, habitat aesthetics, tree losses), quarantine pest outbreaks, and eradicate or prevent the spread of introduced invasive species. Therefore, forest canopy pest management programs provide environmental, economic, and quality of life benefits. The type of forest canopy pest control is dictated by the biology of the target pest and by environmental conditions and concerns for a specific area.

Part 2.2.4.a -- Identify the Problem

Prior to the first pesticide application covered under this permit that will result in a discharge to waters of the United States, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must do the following for each pest management area. In order to reduce pesticide discharges into State waters associated with forest canopy pest control, it is important for Operators to ensure proper problem identification. Problem identification is determined through pest identification, delineation of the extent and range of the pest problem, determination of the potential for pest problem expansion, and assessing the economic impact of not implementing Pest Management Measures.

Establish any pest- and site-specific action threshold. Operators must develop action thresholds for the target pests prior to the first pesticide application. The action thresholds must be re-evaluated at least

once each calendar year. An action threshold is a point at which pest populations or environmental conditions indicate that Pest Management Measures must be taken and helps determine both the need for implementing Pest Management Measures and the proper timing of such actions. It is a predetermined pest level that is deemed to be unacceptable.

Identify target pest(s) to develop Pest Management Measures based on developmental and behavioral considerations for each pest. Pest identification is a key activity for implementation of a forest canopy pest control system. Pest identification should only be conducted by personnel with adequate training and experience with the pests. While numerous similar pests (insects and/or pathogens) may be present in any given location, only a few of the representative pest may constitute a threat which requires control activities. Through proper pest identification informed control decisions can be made based on the development biology of the pest (susceptible development stage), pest mobility (potential rate of spread), timing of selected Pest Management Measures, applicable control techniques, and most effective chemical pesticides for the target pests (insecticide class, resistance, etc.). Failure to identify pests can lead to unwarranted control activities and/or the need for chemical application with potential for discharges into State waters. Control for each specific pest is also predicated on the status of the pest as native recurring, quarantine restricted, or designated as an invasive species.

Identify current distribution of the target pest and assess potential distribution in the absence of Pest Management Measures. Control activities are warranted only after exact pest identification and delineation of the extent of the pest infestation. As forest canopy pest control can involve treating large expanses of forests, mapping is also an important component in identification of the problem. The distribution of the pest, usually insects, within the area of infestation can impact the selection of Pest Management Measures. In addition, mapping of the pest infestation will allow evaluation of the actual/potential spread of the infestation (*e.g.*, pest biology, pest mobility, and host availability) and also serve as a tool to evaluate the effectiveness of the Pest Management Measures. Mapping can also provide essential information for assessment of economic damages that can result from the current and potential pest infestation and failure to control the pest. Management decisions can thereby be based on cost/benefit evaluations based on the current and potential distribution of any pest.

The third component of problem identification is to determine the potential economic impact of not controlling the pest. By establishing economic thresholds, it is possible to determine pest action thresholds which warrant control activities. However, control decisions must take into account not only the projected economic impact of the current pest infestation but also the potential of the pest infestation to spread. Therefore, control decisions based on economic impact must in turn rely on proper pest identification, pest biology, and current and potential pest distribution.

In the event there are no data for the pest management area in the past calendar year, use other available data as appropriate. Operators may use historical data or neighboring district data to identify the pest and establish action thresholds.

Part 2.2.4.b. -- Pest Management Options

Prior to the first pesticide application covered under this permit that will result in a discharge to waters of the United States, and at least once annually prior to the first pesticide application each ensuing calendar year, any Operator whose application exceeds the annual treatment threshold must select and implement efficient and effective means of Pest Management Measures that minimize discharges resulting from the application of pesticides to control pests. Pest control activities in forest canopy management programs may be warranted following problem identification and based solely on pest occurrence (*e.g.*, quarantine pest, invasive species). However, in many instances control activities may only be necessary based on pest population distribution and/or pest densities. To minimize the need for pest control while also producing the best control results, Pest Management

Measures appropriate for the specific problem site(s) must be developed. A site-specific management plan will consider biotic (*e.g.*, plant and animal species community structure) and abiotic (*e.g.*, environmental) factors. Combinations of various management options are frequently the most effective Pest Management Measures over the long term. The goal of Pest Management Measures in forest canopy pest control should be to emphasize long-term control rather than a temporary fix.

All Pest Management Measures must be conducted in a manner that minimizes impacts to non-target species. The following is a discussion of the relevant management options as they might be implemented for forest canopy pest control.

No Action - No action is to be taken, although a pest problem has been identified. This may be appropriate in cases where available control methods may cause secondary or non-target impacts or where aesthetic/economic losses are not anticipated.

Mechanical/Physical Methods - Mechanical and biological controls will be the appropriate method in some cases, or a part of a combination of methods. In some instances, the need for chemical pesticide use in and adjacent to the affected habitat can be reduced or virtually eliminated with proper execution of alternative measures and best management practices. Mechanical control techniques will vary depending on the pest. An example of mechanical control in a forest canopy would be egg mass removal (e.g., gypsy moth).

Cultural Methods - Cultural control methods are Pest Management Measures that make the habitat unsuitable for a pest. An example of a cultural method to manage pests of the forest canopy would be to select a different species of tree to plant, or to plant resistant varieties of trees. Maintaining the trees in good health to discourage pests is another method of cultural control.

Biological Control Agents - Biological control of forest canopy pests may be achieved through the introduction/enhancement of diseases, predators, or parasites. In addition, forest canopy pest control programs aimed specifically at insects may also utilize sterile insect release, mating disruption, and biological pesticides. While biological controls generally have limited applications for forest canopy pest control programs, they should be fully considered as an option in the development of Pest Management Measures. The latter two control approaches are often utilized when controlling for gypsy moth.

Pesticides - Several chemical and biological pesticides are available that may be used to reduce defoliation of the trees. These pesticides are typically used when pest populations are high and the action threshold has been reached. They are aerially applied. As described below, once the determination is made to use pesticides, additional requirements must be met.

Part 2.2.4.c. -- Pesticide Use

Conduct surveillance in an area that is representative of the pest problem prior to each application to assess the pest management area and to determine when the pest action threshold is met. Operators must apply pesticides only as needed as determined by pre-established criteria and pest action thresholds. Operators must establish a pest action threshold that warrants pesticide application based on problem identification and pest surveillance. In order to establish pest densities and determine when pest action thresholds have been met, forest canopy pest control programs must include pest surveillance activities as an integral component of Pest Management Measures. Pest surveillance is necessary to detect the presence (or confirm the absence) and magnitude of pest populations in a given location and precisely pinpoint zones of infestation. Surveillance activities will vary according to the pest (insect, weed, or pathogen) but in general should include observations of pest numbers, developmental stage of the current infestation, and biotic factors which would enhance development/expansion of pest populations (*e.g.*, weather, crowding, predators, pathogens, etc.).

Pest surveillance will vary according to pest type and species. For insect pests, surveillance activities may include, but not be limited to, pheromone traps, sticky traps, light traps, defoliation monitoring. In some cases, traps used in surveillance activities have been developed to the extent that they alone provide adequate control of the targeted pest, thus eliminating the need for pesticides completely. Conversely, in the instance of quarantine pests or invasive species, pest identification alone may suffice to fulfill surveillance requirements and indicate need for control measures. Regardless, surveillance should take into account local environmental conditions and projected environmental conditions, which would support development and/or spread of the pest population and which would limit the choice or effectiveness of control activities.

It is also important to continue surveillance following control activities to assess the efficacy of Pest Management Measures and to monitor for new pests. Surveillance can determine if the current techniques are effective and whether additional Pest Management Measures are required, particularly pesticide application. Based on follow-up surveillance activity, Operators can make informed decisions which serve to increase the effectiveness of their control programs and minimize the potential for pesticide discharges to State waters. Surveillance is necessary not only to establish the pest presence and its abundance but also as an evaluation tool of the effectiveness of chemical control activities. Furthermore, surveillance should be used as an indicator of the need for additional chemical control activities based on pre-established criteria related to population densities in local areas.

Reduce the impact on the environment and non-target organisms by evaluating the restrictions, application timing, and application methods in addition to applying the pesticide only when the action threshold(s) have been met. Forest canopy pest and site restrictions (water use, water movement, etc.) must be identified when choosing an appropriate pesticide. For instance, with gypsy moth control, a biological insecticide, Bacillus thuringiensis kurstaki, is usually selected. However, if endangered or threatened butterfly or moth species are in the area, a viral insecticide that specifically targets gypsy moth larvae should be considered. Environmental factors such as temperature, as well as biological factors such as migration timing, should be considered when deciding on application timing. Partial site pesticide applications over time may be considered to minimize risk to non-target organisms. Pesticide application must be limited to the appropriate amount required to control the target pests. Methods used in applying pesticides should weigh the potential impact to non-target species.

Evaluate using pesticides against the most susceptible developmental stage. For forest canopy pests, pesticides should be selected that target the most susceptible life stage. Gypsy moth caterpillars are susceptible to control by chemical pesticides, or by ingestion of nucleopolyhedrosis virus occlusion bodies.

3. Water Quality-Based Effluent Limitations

In addition to technology-based effluent limitations for all discharges, the CWA requires additional effluent limitations that are as stringent as necessary to achieve water quality standards. These are called water quality-based effluent limitations (WQBELs). Permit writers are to assess whether the technology-based effluent limitations are protective of water quality standards, and if not, permit writers must also include WQBELs as necessary to ensure that the discharge will not cause an excursion above any state water quality standard, including state narrative criteria for water quality (see 40 CFR 122.44(d)). In developing WQBELs, permit writers must consider the potential impact of every proposed surface water discharge on the quality of the receiving water. Unlike individual permits that include requirements tailored to site-specific considerations, general permits, while tailored to specific industrial processes or types of discharges (*e.g.*, from the application of pesticides), often do not contain site-specific WQBELs. Instead, in general, permits can include a narrative statement that addresses WQBELs. In this permit the WQBEL is as follows:

The discharge must be controlled as necessary to meet applicable numeric and narrative Maryland water quality standards. If at any time the Operator becomes aware, or the Department determines, that the discharge causes or contributes to an excursion of applicable water quality standards, the Operator shall take corrective action as required in Part III.E.

The first sentence includes the general requirement to control discharges as necessary to meet water quality standards, while the second sentence implements this requirement in more specific terms by imposing on Operators a responsibility to take corrective action in response to an excursion of applicable water quality standards, whether discovered by MDE or by the Operator. Failure to take such corrective action is a violation of the permit. Additionally, the permit includes a provision, in Part II.C of the permit, that specifies that MDE may determine that additional technology-based and/or water quality-based effluent limitations are necessary, or may deny coverage under this permit and require submission of an application for an individual NPDES permit, as detailed in Part II.H.

In addition to the narrative statement, the permit includes specific criteria for the use of copper compounds. Copper limits were specified in the 11PE as follows.

Operators that treat water supply impoundments that are over a half mile long with copper compounds shall not raise copper concentrations above the State water quality criteria (9 ug/l) below the outlet of the impoundment and in over one third the cross-sectional area of the impoundment.

Operators that treat water supply impoundments that are under a half mile long with copper compounds shall not raise copper concentrations above the State water quality criteria below the outlet of the impoundment only.

The 17-PE clarifies how these limits are to be measured, adds the acute standard for in water column, and maintains chronic limits as the limit for entire water impoundment. The 17-PE also adds MCLs for waters protected for drinking water and signage requirements. Both these additional requirements were in the EPA PGP, which served as a template for how these should be address in Maryland.

Each Operator is required to control its discharge as necessary to meet applicable water quality standards. In general, MDE expects that compliance with the other conditions in this permit (*e.g.*, the technology-based limitations, corrective actions, etc.) will result in discharges that are controlled as necessary to meet applicable water quality standards based on the cumulative effect of the following factors, which are described below:

(1) Under FIFRA, EPA evaluates risk associated with pesticides and mitigates unreasonable ecological risk. EPA, MDA and MDE understand that compliance with FIFRA is required. (See Part III.1.5 of this fact sheet.)
(2) In developing the PGP, EPA evaluated national–scale ambient monitoring data, as well as the frequency of the identification of specific pesticides as the cause of water impairments, to assess whether pesticide residues are currently present in waters at levels that would exceed water quality standards. The monitoring data, although limited in scope, show that, in most samples, most pesticides were below ambient water quality criteria or benchmarks developed by EPA's Office of Pesticide Programs (OPP). For this assessment, ambient water quality criteria were available for 7 of the 83 analytes and one or more OPP benchmarks were available for 60 of the 83 analytes. For the small number of pesticides found in monitoring data to be present above such benchmarks, the evaluation, as summarized in Appendices B and C of

the fact sheet for the 2016 PGP, also documents risk mitigation actions taken by EPA (such as cancellation of pesticide uses) that EPA expects have reduced the levels of those pesticides in water.

(3) Technology-based effluent limitations in the permit provide further protections beyond compliance with existing FIFRA requirements.

(4) Biological pesticides discharged to waters, by regulatory definition, do not work through a toxic mode of action. For chemical pesticides, the discharges covered under this permit are the residues after the pesticide has performed its intended purpose. Thus, the residue will be no higher than, and in many instances, lower than, the concentration of the pesticide as applied.

(5) The permit excludes pesticide applications that result in discharges of any pesticide to (1) waters impaired for an active ingredient of that pesticide or a degradate of such an active ingredient, or (2) any Tier 3 waters (*i.e.*, outstanding national resource waters) except for pesticide applications made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis.

(6) EPA has no evidence in the record that implementation of the 2011 PGP has resulted in documented water quality problems, and MDE has confidence in both the TMP and 11-PE protection.

In addition to the six factors identified above, CWA § 401 certifications provide assurance by the state that the permit is in compliance with water quality standards. Under CWA § 401(d), the state certification may include limitations the state determines are necessary to assure that the permit will comply with the CWA or "any other appropriate requirements of State law."

This permit requires Operators to control discharges as necessary to meet applicable water quality standards. When the Operator or the Department determines a discharge will cause or contribute to an excursion above any WQS, including failure to protect and maintain existing designated uses of receiving waters, the Operator must take corrective action to ensure that the situation is eliminated and will not be repeated in the future. (See Part III.E). If additional Pest Management Measures are required, the Department expects the Operator to vigilantly and in good-faith follow and document, as applicable, the process for Pest Management Measure selection, installation, implementation and maintenance, and cooperate to eliminate the identified problem within the timeframe stipulated in Part III.E of the 17-PE.

(1) Under FIFRA, EPA evaluates risks associated with pesticides and considers mitigation measures to address risks that exceed levels of concern.

Background

EPA regulates the use of pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). In general, FIFRA authorizes EPA to register each pesticide product intended for distribution or sale in the United States. To register a pesticide, the Agency must determine that its use in accordance with the label will not cause "unreasonable adverse effects on the environment." (see, *e.g.*, FIFRA sec. 3(c)(5)). FIFRA defines that term to mean, in part, "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide" (FIFRA sec. 2(bb)). The "unreasonable adverse effects" standard requires EPA, in effect, to balance the human health and ecological risks of using a pesticide against its economic, social, human health, and ecological benefits. Pesticides are registered for sale and distribution only if EPA determines that the benefits outweigh the risks. In making decisions on whether to register a pesticide, EPA considers the use directions on proposed product labeling and evaluates data on product chemistry, human health, ecological effects, and environmental fate to assess the potential risks associated with the use(s) proposed by the applicants for registration and expressed on the labeling. Among other things, the Agency evaluates the risks to human health and the environment (including water quality) posed by the

use of the pesticide.

As stated above, EPA reviews and approves pesticide product labeling. EPA implements risk mitigation measures identified through the risk assessment process by placing use restrictions and warnings on labeling to ensure the use of the pesticide (under actual use circumstances and commonly accepted practice) will not cause any "unreasonable adverse effects on the environment." It is a violation under FIFRA sec. 12(a)(2)(G) (FIFRA's "misuse" provision) to use a registered pesticide inconsistent with its labeling.

After a pesticide has been registered, changes in science, public policy, and pesticide use practices will occur over time. FIFRA, as amended by the Food Quality Protection Act of 1996, mandates a registration review program, under which the Agency periodically reevaluates pesticides to ensure that as the ability to assess risk evolves and as policies and practices change, all registered pesticides continue to meet the statutory standard of no unreasonable adverse effects to human health or the environment. The Agency is implementing the registration review program pursuant to Section 3(g) of FIFRA and will review each registered pesticide every 15 years to determine whether it continues to meet the FIFRA standard for registration. Information on this program is provided at: http://www.epa.gov/pesticide-reevaluation.

Ecological Risk Assessment

The following is a discussion about the FIFRA risk assessment process with a focus on Ecological (specifically aquatic) Assessments. Entities seeking pesticide registrations bear the burden of demonstrating their products meet the statutory standard under FIFRA. As set forth in 40 CFR Part 158, applicants for pesticide registrations must provide EPA with a suite of product chemistry, residue chemistry, toxicity, environmental fate, and ecotoxicity studies, to support an application for registration. To support outdoor uses, studies are required that provide information related to the environmental fate and transport of the chemical and that measure the acute and chronic toxicity to terrestrial and aquatic organisms. These studies, along with open literature that meet data quality guidelines, are the basis for the ecological risk assessments. The ecological risk assessment combines the results of an environmental exposure assessment and an ecological effect assessment for a pesticide active ingredients to produce a quantitative measure of potential risk.[11] A risk characterization is also presented to put the quantitative assessment of risk in the context of other lines of evidence, such as available monitoring data and incident reports, and to discuss uncertainties in the risk assessment. The quantitative and qualitative determination of potential ecological risk is independent of economic or other benefit considerations.

Aquatic Exposure Characterization

EPA estimates pesticide concentrations in aquatic environments to determine if exposure to a pesticide active ingredient is at a level that could cause unreasonable adverse effects to aquatic organisms. EPA estimates pesticide concentrations in water using peer-reviewed simulation modeling because there are not sufficient monitoring data to estimate exposure to aquatic organisms under all potential use conditions. When available, monitoring data are used to help characterize aquatic exposure.

EPA also estimates potential exposure from uses involving direct application to water. The model used for pesticides applied directly to water uses environmental fate data to simulate partitioning of the pesticide between the water column and bottom sediment in a standard rice paddy. This modeling is conservative because it does not simulate degradation of the applied pesticide, as would be necessary to estimate the amount of residue remaining after the pesticide product had performed its intended function. Depending on the rate of degradation, the initial concentration as estimated by the model could be much higher than the residual concentration remaining after pesticide application has been completed. Additionally, this modeling scenario is conservative because the resulting exposure estimate is the concentration in the paddy water itself, not taking into account dilution which would occur when paddy

water is diluted by precipitation or when it is released into a receiving water body.

As discussed above, when available, EPA uses ambient water monitoring data as a line of evidence to characterize aquatic exposure in ecological and human health risk assessments. The United States Geological Survey (USGS) maintains several sources of pesticide monitoring data. These sources include the National Water Quality Assessment program (NAWQA), the Toxic Substances Hydrology Program, and the National Stream Quality Accounting Network (NASQAN). EPA sources of water monitoring data include STORET, a storage and retrieval database of national water quality information, the Safe Drinking Water Information System (SDWIS), Office of Water compliance monitoring data, and the USGS/EPA Reservoir Monitoring Program. In addition to the federal data sources, monitoring data are sometimes available from States, pesticide registrants, and the open literature.

These monitoring data are evaluated on a case-by-case basis to help characterize the likelihood, extent, and nature of pesticide concentration in water under current use practices and actual field conditions. EPA considers the locations and frequency of sampling, the analytical methods, the detection limits, and the purpose of the monitoring studies from which the data are derived when determining how such data will be incorporated into the FIFRA risk assessment and the usefulness of the monitoring data for an aquatic exposure assessment. For example, a monitoring study targeted to measure concentrations of a pesticide in a watershed with high agricultural use of that pesticide will not provide much insight on the potential exposure from its use as a mosquito adulticide. Similarly, a general survey of ambient water quality might not necessarily target specific pesticide use areas or the time of year when pesticide concentrations may be at their peak, and for this reason may not provide a reliable estimate of acute exposure. However, if monitoring data from such a study shows higher confirmed detections than estimated by modeling, the higher monitoring values typically would be used in the risk assessment.

In sum, EPA's screening level exposure estimates from simulation models are conservative, consistent with their intended use as a screen to identify pesticide use scenarios that do not pose a risk of concern, both because of the selected inputs used to generate them and the values from the model outputs that are selected for the FIFRA risk assessment. When ambient aquatic monitoring data are available for a given pesticide, monitored concentrations are usually lower than modeled concentrations and in many cases substantially lower. The next section describes the second portion of the risk assessment: effects.

Aquatic Effects

To determine if a pesticide is sufficiently toxic at its estimated exposure concentrations to cause unreasonable adverse effects in the environment, EPA reviews available ecotoxicity data. These data may come from a number of sources, including direct guideline study submissions required in support of registration, and open literature data retrieved through ECOTOX[12]. The typical assessment endpoints for pesticide ecological risk assessments are reduced survival from direct acute exposures and survival, growth, and reproductive impairment from direct chronic exposures. As noted in the OPP Overview[13] document, which describes the process OPP uses to conduct ecological risk assessment under FIFRA, OPP evaluates other data on sublethal effects in addition to direct effects on survival, growth, and reproduction.

In general, the current FIFRA data regulations require studies that include but are not limited to a suite of aquatic toxicity studies for effects characterization. These test requirements are defined for each chemical class by use category (40 CFR Part 158 Subpart D; Wildlife and Aquatic Organism data requirements; http://edocket.access.gpo.gov/cfr_2007/julqtr/40cfr158.490.htm) and are performed on a limited number of laboratory test organisms in the following broad taxonomic groupings:

- Freshwater fish,
- Freshwater invertebrates,
- Estuarine/marine fish,

- Estuarine/marine invertebrates, and
- Algae and aquatic plants.

Within each of these very broad taxonomic groups, the most sensitive acute and chronic toxicity value is selected from all available test data, including open literature and registrant submissions. If additional toxicity data for more species of organisms in a particular group are available, the most sensitive toxicity values from all sources for other species/studies that meet data quality standards are used in the risk assessment[14]. Aquatic toxicity data are required for each active ingredient, but aquatic toxicity data are also required on the typical end use product for any pesticide that will be introduced directly to aquatic environments (40 CFR Part 158.630).

Risk Characterization

Risk characterization is the integration of effects and exposure characterization to determine the ecological risk from the use of the pesticide and the likelihood of effects on non-target species based on the pesticide-use scenarios. In FIFRA screening-level assessments, OPP relies on the deterministic risk quotient (RQ) method to compare estimated exposure to toxicity endpoints. Estimated environmental concentrations (EECs) derived in the exposure characterization are divided by acute and chronic toxicity endpoints identified in the effects characterization. Risk quotients are then compared to the Agency's Levels of Concern (LOCs). These LOCs are the Agency's interpretative policy and are used to analyze the potential risk to non-target organisms and the need to consider regulatory action. These criteria are used to indicate when a pesticide use as directed on the label has the potential to cause adverse effects on non-target organisms. If a risk of concern is identified, risk mitigation measures are considered.

Risk Mitigation

EPA and the Department acknowledge that there are uncertainties in its pesticide risk assessments (see full discussion below), nonetheless the permit implmentation reduces the risks of concern by imposing additional restrictions on the use of a pesticide to reduce pesticide concentrations in the aquatic environment. Mitigation measures may include limits on the amount and frequency that a pesticide may be applied, or the application methods may be restricted to limit off-site transport. Mitigation may also limit the geographical areas to which a pesticide can be applied or may include mandatory buffer distances from sensitive habitats. Mitigation measures are implemented through product labeling instructions, with which pesticide users are required to comply.

In some cases, EPA restricts the use of a pesticide so that levels of pesticide predicted by the model to reach water are below the relevant aquatic benchmarks (see Aquatic Benchmarks discussion below). In other cases, using the FIFRA risk-benefit balancing standard, EPA may permit the use of a pesticide even though the estimated water concentration might exceed a relevant benchmark. In such cases, the decision incorporates consideration of the benefits of the pesticide use and other lines of evidence, such as any available National Recommended Water Quality Criterion for ambient water quality, concerning the conservativeness of the modeling assessment and available monitoring data.

Uncertainties with Risk Assessment and Mitigation

For the majority of pesticides, the Agency relies on simulation modeling to predict potential aquatic exposure following pesticide applications. There are uncertainties embedded in the FIFRA exposure assessment, for example, the extent to which the simulated scenario represents actual use conditions in terms of hydrologic vulnerability and the amount and frequency with which pesticides are applied. In order to account for the inherent uncertainty the Agency uses a combination of parameters and assumptions in the models that results in estimated potential exposure concentrations that are high-end and are not likely to underestimate actual aquatic exposure. This allows the Agency to identify pesticides that are not likely to pose a risk to aquatic life.

In the effects characterization under FIFRA, the lowest acute and chronic toxicity values from the most sensitive species tested in acceptable studies are used as the relevant endpoint for evaluating risk to various taxa. Implicit in the use of the lowest toxicity values for the most sensitive species is the presumption that these toxicity values afford protection not only for the individual surrogate species but for other untested taxa as well.

In the FIFRA risk characterization, data gaps are also considered as a source of uncertainty in the risk assessment conclusions, and each risk assessment discusses the potential for additional data to affect the risk assessment conclusions.

An additional source of uncertainty in assessing risk to aquatic life is the impacts of multiple stressors on aquatic organisms. A United States Geological Survey (USGS) 10-year study (*Gilliom et al., 2006*) shows that the most common form of pesticide exposure for aquatic organisms is simultaneous exposure to multiple pesticides. More than 50 percent of all stream samples contained five or more pesticides, although the majority of mixtures are comprised mainly of agricultural herbicides and degradates of these herbicides, or urban/residential use insecticides in urban streams. Pesticides that will be applied under the PGP may also co-occur with other manmade contaminants and/or other pesticides from other uses. For instance, the USGS has also performed monitoring studies which revealed the widespread presence of some pharmaceuticals and personal care products in drinking water. However, although pesticides may be detected with other chemicals or in discharges covered by other NPDES permits, the majority of research and data on the effects of pesticides has focused on individual pesticides rather than on additive and synergistic toxic effects of exposure to multiple pesticides and/or non-pesticide toxicants.

Possible interactions among pesticides or between pesticides and other contaminants may occur including: independent, additive, antagonistic, or synergistic. The variety of chemical interactions presented in the available literature suggests that the interaction can be a function of many factors including but not necessarily limited to: (1) the exposed species, (2) the co-contaminants in the mixture, (3) the ratio of concentrations in the mixture, (4) differences in the pattern and duration of exposure among contaminants, and (5) the differential effects of other physical/chemical characteristics of the receiving waters (*e.g.*, organic matter present in sediment and suspended water). Quantitatively predicting the combined effects of all these variables on mixture toxicity to any given taxon with confidence is beyond the capabilities of the available data. In order to assess the impacts of environmental mixtures on aquatic life, states have included ambient toxicity testing (also called Whole Effluent Toxicity or WET testing) in their monitoring programs. WET testing allows states to identify potential impacts to aquatic life and identify the toxicant(s) and through the toxicity reduction evaluation, reduce the source(s) of the toxicant(s). The level of toxic effect to the most sensitive tested species is therefore assumed to be protective of other species that may be present in any given water body and is assumed to represent the most toxic component of a mixture. Note that a discussion of EPA's consideration of WET testing as a condition of the permit is discussed in Part III.4 of the fact sheet.

Aquatic Benchmarks

EPA's Office of Pesticide Programs (OPP) derives aquatic benchmarks by multiplying the most sensitive toxicity values (*i.e.*, the lowest acceptable toxicity value for the most sensitive species within a taxonomic group) by their respective (level of concern) LOC. These taxon-specific benchmarks, based on toxicity data used by OPP in assessments for FIFRA pesticide registration decision-making, are considered estimates of the concentrations below which pesticides are not expected to have the potential for adverse effects for the particular taxon for which those data serve as surrogates. It is reasonable to assume that above these levels, there may be potential for the pesticide to cause adverse effects to the given taxon.

EPA's Office of Water (OW) and OPP agreed that these values can be used by States and others to evaluate potential risks of pesticides in the aquatic environment, if a National Recommended Water Quality Criterion for ambient water quality is not available.[15] A number of states have used these benchmark values as indicators of whether pesticide residues detected in surface water warrant additional action such as refined monitoring efforts. While benchmarks can be useful as a screening tool, they do not provide the information necessary to link detected concentrations with their sources.

In response to recommendations and input from stakeholders, EPA developed a webpage of non-regulatory "OPP Aquatic Benchmarks."[16]

As described above, EPA's FIFRA risk assessment process includes a number of conservative assumptions that taken as a whole mitigate unreasonable ecological risk and protect water quality.

(2) Examination of national–scale ambient monitoring data to assess whether pesticide residues are currently present in waters at levels that would exceed water quality standards.

The following reports and summary were included in the EPA PGP record, and are referenced here as support for the Department's conclusions on impacts of pesticides to surface and ground water.

United States Geological Survey: The Quality of Our Nation's Waters – Pesticides in the Nation's Streams and Ground Water, 1992-2001.

In addition to the protective nature of the pesticide risk assessment, EPA reviewed readily available surface-water monitoring data. In 2006, the USGS National Water-Quality Assessment Program (NAWQA)[17] released a 10-year (1992-2001) study of 51 major river basins and aquifer systems that account for more than 70 percent of total United States water use and more than 50 percent of the United States drinking water supply. Most NAWQA samples were analyzed for 75 pesticides and eight degradation products, including 20 of the 25 most commonly used herbicides and 16 of the 25 most commonly used insecticides. Water samples were collected at 186 stream sites for analysis of pesticides and degradates dissolved in water. The samples were collected from streams throughout the year, including high-flow and low-flow conditions. Sampling was most intensive during the time of highest pesticide use and runoff – generally weekly or twice monthly for a 4- to 9-month period. As a general matter, the USGS uses sampling and analytic methods that provide highly reliable data. The NAWQA database stands out among available data sources in terms of the number of pesticides and sites examined, as well as the overall number of samples collected and analyzed.

Overall results. Overall, the 10-year assessment indicates that for the pesticides sampled, surface and ground water are generally not being adversely affected by pesticide applications for irrigation, drinking water, and home/recreational uses. The USGS analytical methods are very sensitive and are designed to detect and measure minute amounts – in some cases parts per trillion – that are often 10 to 100 times lower than benchmarks or water quality criteria for most pesticides. There were detections of pesticides in these samples, but the concentrations detected were generally low (parts per billion and parts per trillion). The NAWQA data generally reflect pesticides that were used in watersheds from which water samples were taken. There were also some detections of legacy pesticides that were no longer registered at the time of sampling.

For environmental effects, the USGS compared the concentrations found in the NAWQA sampling with two general types of aquatic life benchmarks (1) ambient water quality criteria (AWQC) for the pesticide and (2) benchmarks derived from the lowest acute and chronic ecological effects endpoint for the pesticide (OPP benchmarks). Acute AWQC and all acute OPP benchmarks were compared with each measured concentration for the most complete year of data for each NAWQA stream. Chronic AWQC were compared with 4-day moving average concentrations, chronic OPP benchmarks for invertebrates were compared to 21-day moving average concentrations, and chronic fish OPP benchmarks were compared to 60-day moving average concentrations. AWQC were available for 7 of the 83 pesticides and

degradates analyzed by NAWQA. One or more OPP benchmarks were available for 60 of the 83 NAWQA analytes, including 5 of the 7 that had AWQC. A total of 62 of the pesticide compounds analyzed in water by NAWQA had one or more aquatic-life benchmarks.

A total of 20 pesticides or degradates exceeded an EPA benchmark in one or more agricultural stream and/or urban stream (see Appendix A of fact sheet for a complete list of pesticides/degradates that had exceedances). In agricultural streams, most concentrations greater than a benchmark involved chlorpyrifos, azinphos-methyl, atrazine, *p,p*'-DDE or alachlor. In urban streams most concentrations greater than a benchmark involved diazinon, chlorpyrifos, or malathion. It should be noted that pesticide concentrations in agricultural streams most often originate from terrestrial agricultural activities and the NAWQA 10-year study acknowledges that its assessment of pesticides focuses primarily on non-point sources. Runoff from terrestrial agricultural activities is exempted under the CWA from NPDES permit requirements and is not covered under this permit.

Since 2001, the last year of sampling covered by the NAWQA report, EPA has taken regulatory action under FIFRA with respect to all 20 pesticides found to be in excess of a benchmark and many of their uses have been canceled (several detections were of pesticides no longer in use prior to the start of the study). For atrazine, the registrant has been required to undertake an aggressive and innovative ecological monitoring program to protect vulnerable watersheds in areas of atrazine use, and to develop mitigation measures for watersheds that might have atrazine detections above levels of concern. Residential uses of the two pesticides most commonly detected above a benchmark (diazinon and chlorpyrifos) have been canceled.

Environmental Science and Technology: Pesticides in U.S. Streams and Rivers: Occurrence and Trends during 1992–2011

In 2014, the USGS National Water-Quality Assessment Program (NAWQA)[18] released a study of pesticide monitoring in streams and rivers across the U.S. for the decade of 2002–2011 that compares monitoring data to previously reported findings from the decade of 1992–2001.
This report indicated that with regard to chronic aquatic life benchmarks, during 1992 – 2001, 16 pesticides exceeded a chronic aquatic life benchmark, while during 2002 – 2011, 21 pesticides exceeded an aquatic life benchmark. Forty-seven pesticides were assessed in both decades. For 10 of these[19] with benchmark exceedances in both decades, exceedance frequencies were mostly lower during 2002 – 2011.[20] [21]This research found that that the proportion of assessed streams with one or more pesticides that exceeded an aquatic life benchmark were very similar between the two decades for agricultural (69% for 1992 – 2001 compared to 61% for 2002 – 2011) and mixed use streams (45% compared to 46%). For urban streams the percentage increased from 53% during 1992 – 2001 to 90% during 2002 – 2011 predominantly due to the use of fipronil and dichlorvos in the latter decade (these two pesticides are among those not assessed for 1992 – 2001). Additional detail on the nature of EPA's regulatory actions under FIFRA appears in Appendices B and C of EPA's PGP fact sheet.

State Water Quality Monitoring under CWA

Every two years states must identify, based on ambient sampling, waterbodies that are not attaining water quality standards (WQS; both narrative and numeric) under CWA Section 303(d). States must place waterbodies not meeting water quality standards on a list (303(d) list) which identifies the pollutant or pollutants causing or expected to cause the impairment. The Office of Water's Impaired Waters and Total Maximum Daily Loads website[22] (accessed December 2015) indicates 303(d) impairments in several states for 21 currently registered specific pesticides and 4 general classes of pesticides (*e.g.*, pyrethroids; Table 1). With the adoption of a 303 list, states are required to develop a Total Maximum Daily Load (TMDL). States also must include a priority ranking for developing those TMDLs. A critical component in the TMDL process is to identify the sources of each parameter for which the waterbody is listed. Then, the State must develop waste load allocation(s) for point source(s) and load allocation(s) for nonpoint source(s).

Table 1. Currently registered pesticide active ingredients listed as causes of 303(d) impairment (data accessed December 2015).

Cause of Impairment	States
1,2-Dichloroethane	ME
2-Methylnaphthalene	CA, NH
Aldicarb	CA, NY
Alpha-BHC	CA, WA
Atrazine	IIL, KS, MO, NE, OH
Carbofuran	CA
Chlorpyrifos	CA, ID, MO, OK, OR, WA
Diazinon	CA, KS, OK, WA
Dichlorvos	CA
Dimethoate	CA
Diuron	CA
Endosulfan	CA, WA
Indo[1,2,3-CD]Pyrene	NH, WA
Malathion	CA, ID
Naphthalene	NH
Oxyfluorfen	CA
Permethrin	CA
Prometryn	CA
Simazine	CA
Trifluralin	CA
Pesticides – listed generically	CA, DE, HI, IN, NY, OH, PA, PR, WA

According to the Office of Water's Impaired Waters and Total Maximum Daily Loads website there are a total of 74,896 causes of impairments for 303(d) listed waters. Of these, approximately 2.4% (a total of 1,796) are listed as pesticides. The majority (71% or 1,273 of the 1,796) of impairments attributed to pesticides are for those no longer registered for use by the EPA. A total of 23% (407 of the 1,796) of impairments are attributed to currently registered pesticides, with an additional 6.4% (116 of the 1,796) of the impairments listed generically for pesticides, such as for "pesticides" or "organochlorine pesticides." Combined, these two categories of listings account for 0.7% (523 of 74,896) of the total causes of impairments for 303(d) listed waters nationally. However, it is important to note that many states do not routinely monitor for many currently registered pesticides. This is a source of uncertainty for this assessment. Additionally, 4,073 impairments are listed for "impaired biota" and 1,220 impairments are for an "unknown" or "cause unknown – fish kills", which together account for about 7% of all impairments.

In EPA's development of the 2011 PGP, the EPA received ambient monitoring data for pesticides present in waters that are attributable to a variety of types of pesticide use patterns from states and other stakeholders. These data are included in the administrative record for the 2011 permit (see docket number EPA-HQ-OW-2010-0257) and in general, do not show the presence of pesticides in concentrations above levels of concern (*i.e.*, recommended ambient water quality criteria – available at https://www.epa.gov/wqc/national-recommended-water-quality-criteria or FIFRA OPP benchmark levels – available at https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-pesticide-registration).

EPA has compared available CWA 303(d) impairment information regarding water quality impairments caused by pesticides for states expected to be covered by the 2016 PGP with active ingredient

information submitted pursuant to the annual report requirements in the 2011 PGP. Annual report data for 2012-2014 was examined. EPA found that of the 17 pesticide active ingredients identified on the relevant 303(d) lists as causes of water quality impairment, 7 of these pesticides have been cancelled and others have significant restrictions. The Department also evaluated pesticide impairments, and found similar results for Heptachlor Epoxide and Chlordane impairments. Based on annual report data, none of the 303(d) impairments caused by pesticides in PGP states for the 303(d) reported years were for pesticides applied under the PGP in those respective states.

2004 National Water Quality Inventory Report

States, tribes, and territories are required to report biennially on the water quality of navigable waters in their boundaries, and the extent to which these waters support designated uses, under Section 305(b) of the Clean Water Act. In its report to Congress on the 2004 reporting cycle[27], which was submitted in January 2009, the Agency reported the results on the portion of waters of the United States evaluated during that cycle. The report indicated that 44% of river miles assessed, 64% of lake acres assessed, and 30% of the square miles of estuaries assessed were impaired for failing to support at least one designated use.

While pesticides are not always monitored when assessing water quality, the Report to Congress indicated that pesticides were not among the most common causes of impairments in the 2004 cycle for rivers and streams, nor for lakes, ponds and reservoirs. Pesticides were the sixth leading cause of impairments for bays and estuaries, but the Report did not indicate whether these were caused by actively registered pesticides, or by sediment contamination by persistent legacy pesticides, which as described above account for the majority (74.3%) of water impairments caused by pesticides nationwide. The Report does not indicate whether any impairments identified by the states were caused by discharges that will be subject to NPDES permits under the CWA.

Interpretation of Monitoring Data Relevant to the Pesticides General Permits (17-PE, PGP)

When EPA is re-evaluating the registrations of existing pesticides, the Agency considers available surface-water monitoring data as a line of evidence regarding potential aquatic risk in addition to considering exposure estimates derived from simulation models. Such monitoring data can provide a measure of trends in aquatic exposure associated with mitigation measures imposed by the Agency. For instance, the USGS's 2009 report of *Trends of Pesticide Concentrations in Corn-belt Streams* states, "(t)he declines in pesticide concentrations closely followed declines in their annual applications, indicating that reducing pesticide use is an effective and reliable strategy for reducing pesticide contamination in streams." Similarly, a study entitled *Trends in pesticide concentrations and use for major rivers of the United States*[28] found that "pesticides strongly dominated by agricultural use (cyanazine, alachlor, atrazine and its degradate deethylatrazine, metolachlor, and carbofuran) has widespread agreement between concentration trends and use trends" and that "pesticides with substantial use in both agricultural and nonagricultural applications (simazine, chlorpyrifos, malathion, diazinon and carbaryl) had concentration trends that were mostly explained by a combination of agricultural use trends, regulatory changes, and urban use changes inferred from concentrations trends in urban streams."

Monitoring studies are valuable because they may specifically target areas in which pesticides considered in the study are likely to be used. This is an effective way of evaluating impact from mitigation measures, or the increase in use of other pesticides that might replace pesticides to which mitigation measures are applied.

The best way to interpret the likely causes of pesticide detections in surface water is to consider any detection in light of the design of the monitoring study itself. For instance, the USGS's study *The Quality of Our Nation's Water – Pesticides in the Nation's Streams and Ground Water, 1992-2001*, described above, used a targeted approach, focusing on areas of relatively homogenous land-use and environmental settings to relate pesticide occurrence to individual non-point sources. The sampling was

also most intensive during periods of high pesticide use and runoff. Such a design can best capture transport of pesticide to surface water from runoff from treated agricultural fields (or treated buildings/lawns) in a watershed. But, the timing and location of sample collection may not be as effective in capturing residues of pesticides applied for purposes covered under the General Permit. Concentrations detected could at times reflect such uses, but the design of the study was meant to capture more diffuse non-point transport of pesticides in watersheds, and not point source discharge.

Uncertainties with Monitoring Data

The Agency recognizes that monitoring of pesticide levels in water has limitations in its ability to identify whether use of specific pesticide may adversely affect water quality. The product monitoring data give only a "snap shot" of the concentration in a particular waterbody at a particular time. While the USGS (*Gilliom et al., 2006*) intensified the frequency of its monitoring during times of the year when most agricultural pesticide usage commonly occurred, their sampling did not necessarily account for timing of specific pesticide applications, frequency of applications, and meteorological events that can cause pesticides to reach surface water as covered by this permit. Thus, monitoring may not collect a sample when pesticide concentrations are at peak levels or when present in the water. Moreover, if monitoring detects the presence of a pesticide, the data usually do not identify the source or if the pesticide residue is actually still a product serving its intended purpose. Ambient monitoring cannot determine whether the contamination was due to lawful use (and if so, which one) or unlawful pesticide use, an accidental spill or discharge, or whether the residues detected were from runoff, or from aquatic uses such as those to be included in the NPDES general permit. Monitoring data are often difficult to interpret because the ancillary data on pesticide usage in a basin, and factors that could make the location more or less vulnerable are often not available.

(3) Technology-based effluent limitations in the 17-PE provide further protections beyond compliance with existing FIFRA requirements.

EPA and the Department have evaluated available information and expects that the technology-based effluent limitations are as stringent as necessary to meet applicable WQS. These effluent limitations require Operators to minimize the discharge of pesticides through the use of the most efficient and effective means of Pest Management Measures, including pesticide and non-pesticide methods.

The technology-based effluent limitations require Applicators to minimize the discharge of pesticides by using only the amount of pesticide and frequency of pesticide application necessary to control the target pest, maintaining pesticide application equipment in proper operating condition, and ensuring weather conditions in the treatment area are appropriate for pesticide application.

The Applicator, to the extent not determined by the Decision-maker, must also use only the amount of pesticide and frequency of pesticide application necessary to control the target pest, using equipment and application procedures appropriate for the task.

Certain Decision-makers are also required to more fully assess and implement procedures to minimize the discharge of pesticides. In this assessment, these Decision-makers must consider human health and ecological impacts, feasibility, and cost effectiveness and include prevention, mechanical/physical methods, cultural methods, biological control agents, and as a final resort, the application of pesticides. To ensure that pesticide discharges are minimized, these Decision-makers must identify target pest species and areas where those pests occur, identify the possible sources of the problem, and establish action thresholds or similar measures for implementing pest management strategies. The technology-based effluent limitations in Part III.A of the permit also require certain Decision-makers, as appropriate, to analyze surveillance data prior to each pesticide application to determine when pest action thresholds are met.

The general permit includes several other provisions that are expected to provide further protections beyond compliance with FIFRA requirements. For instance, the permit requires Operators to monitor pesticide applications activities to minimize discharges and during any post-application monitoring to determine effectiveness of the pesticide application. In addition, the permit contains requirements for all Operators to document and report adverse incidents involving non-target organisms or the environment, and to take corrective action if it is determined that revising Pest Management Measures can help to prevent future incidents. An adverse incident report calls attention to a situation in which water quality may be impacted by pesticide use and may indicate that corrective action is required to ensure that water quality standards are further protected during future applications. The permit also requires Operators to take corrective actions to eliminate other situations such as unauthorized releases (*i.e.*, spills or leaks) or the failure to meet applicable water quality standards. The Department expects this approach will further reduce discharges of pesticides to Waters of this State from the use patterns covered under this permit.

(4) Biological pesticides either do not work through a toxic mode of action, or when they do, are toxic only to a very narrow range of target pest organisms. For chemical pesticides, the discharges covered under this permit are the residues after the pesticide has performed its intended purpose.

The permit provides coverage for point source discharges from certain applications of pesticides. Discharges from the application of both chemical and biological pesticides are covered under the permit, consistent with the Sixth Circuit Court's reading of the CWA term "pollutant" in *National Cotton Council v. EPA.*

For chemical or conventional pesticides applied directly to waters (*e.g.*, for aquatic weed control and aquatic nuisance pest control), it is the pesticide residue, including excess pesticide that is present outside of the treatment area or within the treatment area once the target pests have been controlled that is considered a pollutant under the 17-PE. For any pesticide applied over water (*e.g.*, mosquito control), any pesticide or pesticide residue that is incidentally deposited in Waters of this State is considered a pollutant since the intended purpose of the application is to target pests above the water. Therefore, the concentrations of "pollutants" will be no higher, and in many instances significantly lower, than the product concentrations considered in EPA's assessment when the Agency registered the pesticide products for the relevant uses.

Discharges of biological pesticides require permit coverage regardless of whether or not a residue exists. Biological pesticides or biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. Two classes of biopesticides are relevant to this permit, microbial pesticides and biochemical pesticides. Microbial pesticides consist of a microorganism (*e.g.*, a bacterium, fungus, virus, or protozoan) as the active ingredient. The most widely used microbial pesticides are subspecies and strains of *Bacillus thuringiensis*, or Bt which operate by a toxic mode of action yet they are toxic only to a very narrow range of target pest organisms (mosquito larvae). Biochemical pesticides, as defined in 40 CFR 158.2000(a), are naturally occurring substances that control pests by non-toxic mechanisms. Biochemical pesticides include substances, such as insect sex pheromones that interfere with mating, as well as naturally-occurring repellants and attractants.

Biopesticides are usually inherently less toxic than conventional pesticides and generally only affect the target pests and closely related organisms. Often, they are effective in very small quantities and decompose quickly thereby resulting in lower exposures and largely avoiding the pollution problems caused by chemical pesticides. When used as a component of Integrated Pest Management (IPM) programs, biopesticides can greatly decrease the use of chemical pesticides; however, use of biopesticides effectively requires users to have a very good understanding of pest management. Since biochemical pesticides, by regulatory definition, do not work through a toxic mode of action they may be less likely to result in an excursion of a water quality standard.

(5) The 17-PE excludes pesticide applications that result in discharges of any pesticide to (1) waters impaired for an active ingredient in that pesticide or a degradate of such active ingredient or (2) any Tier 3 waters (*i.e.*, outstanding national resource waters) except for applications made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis.

The Department identified these scenarios where it finds the 17-PE may not be adequately protective of water quality standards and has excluded those discharges from coverage under this 17-PE. Namely, the 17-PE excludes from coverage: (1) any discharges from a pesticide application to Waters of this State if the water is identified as impaired by a substance which either is an active ingredient in that pesticide or is a degradate of such an active ingredient and (2) discharges to Tier 3 Waters (*i.e.*, Outstanding National Resource Waters) except for pesticide applications made to restore or maintain water quality or to protect public health or the environment that either do not degrade water quality or only degrade water quality on a short-term or temporary basis. Any Operator desiring to discharge in either of these two scenarios is required to submit an application for an NPDES individual permit. Links to lists of impaired waters and Tier 2 waters is available at http://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/Antidegradation_Policy.aspx. There are currently no Tier 3 waters, however they protection is still provided if they were identified in Maryland. Additional discussion of the basis for these requirements is provided in Part III.1.1.2 of the fact sheet.

(6) EPA has no evidence in the record that implementation of the 2011 PGP has resulted in documented water quality problems. The Department has no evidence that implementation of the 11-PE and TMP resulted in documented water quality problems.

EPA has not received any adverse incident reports documenting water quality problems under the 2011 PGP to date. EPA is also not aware of any negative public health or environmental impact resulting from discharges authorized for use under the 2011 PGP.

4. Site Monitoring

Monitoring is required in any NPDES permit to demonstrate compliance with the permit conditions. Monitoring requirements apply from the time any authorized Operator begins discharging under the 2016 PGP. These requirements are not tied to submission of an NOI. There are a variety of monitoring methods that a "traditional" NPDES permit may require, including end-of-pipe monitoring to show compliance with relevant water quality-based and technology-based effluent limitations prior to discharging to a receiving waterbody. Monitoring may also pertain to actions taken to ensure that record keeping or other permit control activities are being properly implemented. Water quality monitoring of receiving streams is not typically required in NPDES permits unless it is required to determine among other things, compliance with mixing zone dilution standards or some other special permit condition.

Pursuant to CWA sections 308 and 402(a)(2), 40 CFR 122.43(a), and other applicable implementing regulations, the following requirements have been included in the permit, as discussed below. The monitoring requirements of the 17-PE are narrative and demonstrate compliance with permit conditions by using currently established pesticide use routines for monitoring pest control. For instance, the 17-PE requires routine visual inspections (described below) to be conducted as part of the pest control activity and/or as part of post-application pest surveillance, and calls for records of the pesticide discharge volume to be kept. The monitoring requirements of the permit are reasonable measures of good pest management practice that the conscientious Operator should be currently employing to ensure environmental health and safety and optimal control of pest organisms.

In addition, EPA will collect information required from their permittees and will also solicit and collect information and water quality monitoring and other data from states, federal agencies, and other entities on water quality to help determine the presence of pesticides, degradates, metabolites, etc. EPA will encourage states, federal agencies, and other entities to collect this information. The Agency will compile and analyze this information and data. and intends to meet with NMFS annually during the permit term to present and discuss the results and identify data gaps and possible approaches to address the gaps. The Department will be monitoring these ongoing investigations to determine if additional controls or action need to take place.

Monitoring of pesticide discharges poses several challenges not generally encountered in "traditional" NPDES permitting situations. For example, there is no "wastewater discharge" per se from pesticide applications that is analogous to end-of-pipe discharges. For example, a manufacturing plant would typically direct its wastewater through a treatment system to remove pollutants, and then would direct the effluent through a pipe into a receiving waterbody. However, for chemical pesticide applications, at the time of application the pesticide contains both the portion serving its intended purpose as well as the potential residual for which monitoring data would be appropriate. Thus, monitoring the "outfall" in this case would merely provide data on the amount of the product as applied (information already known through the FIFRA registration process) and would be inappropriate to compare with any type of technology based effluent limitation or water quality standard.

EPA considered requiring ambient water quality monitoring. However EPA determined that it was infeasible for the following reasons:

1) Uncertainty: Ambient water quality monitoring would generally not be able to distinguish whether the results were from the pesticide application for which monitoring is being performed, or some other upstream source.
2) Lack of applicable measurable standards: Federal pesticide-specific ambient water quality criteria do not exist at this time for the vast majority of constituents in the products authorized for use under the permit.
3) Safety and Accessibility: Pesticides, particularly those used for mosquito control and forestry pest control, are often applied over waterbodies in remote areas, hazardous terrain, and swamps that are either inaccessible or pose safety risks for the collection of samples.
4) Difficulty of residue sampling for chemical pesticides: For chemical pesticides, the "pollutant" regulated by this permit is the residue that remains after the pesticide has completed its activity, and it is this residue that would be the subject of any water quality monitoring requirement. However, the point at which only "residue" remains is not practically discernable at this time for all pesticides.
5) Usefulness of data: Some states have questioned the value of ambient water quality monitoring data obtained from state permitting programs. The data generally showed that water quality impacts were not occurring, and one state even discontinued the requirement in revisions of its state permit.

Given the infeasibility of requiring ambient water quality data to demonstrate permit compliance, EPA has determined, and the Department as agrees, that there are suitable alternative monitoring activities to determine permit compliance, other than ambient water quality monitoring, for the permit.

Additionally, in assessing the appropriateness of requiring ambient water quality monitoring, EPA also considered Whole Effluent Toxicity (WET) testing as a possible option for assessing Operator compliance with permit conditions; however, WET testing in an NPDES permit program is best used to monitor whether an Operator's discharge is toxic and not whether a receiving stream (*i.e.*, the ambient environment), that may be influenced by a number of different discharges from different Operators and different sources, is toxic. In addition, WET testing would not indicate the actual source of the toxicity. If

a waterbody is found to be toxic or to contain pollutants above water quality standards, it can be quite complex to identify the source of the toxicity, which may or may not actually be the NPDES permittee performing the monitoring.

Thus, the monitoring program that EPA has developed, and that the Department implemented, for the permit has been tailored to accommodate the unique situations related to pesticide applications. Routine visual monitoring is required in the 17-PE and can be used to determine if any pesticide use practices may need to be revised to ensure that avoidable adverse impacts to the environment do not occur. Monitoring records required by those Operators who submit NOIs will establish a history that may indicate if or when practices need to be reconsidered. The monitoring requirements in the 17-PE remain unchanged from the 11-PE.

4.1. Visual Monitoring Requirements for Pesticide Applicators

Visual monitoring assessments are required as a means of identifying, for example, instances of detrimental impact to non-target organisms, disruption or degradation of wildlife habitat, or the prevention of designated recreational or municipal uses of a waterbody that may possibly be related to the Operator's use of pesticides in a given area. This requirement consists of visually monitoring the area to and around where pesticides are applied for possible and observable adverse incidents, such as unanticipated death or distress of non-target organisms and disruption of wildlife habitat, recreational or municipal water use.

Visual monitoring assessments are required during the pesticide application when feasibility and safety allow. Visual monitoring is not required during the course of pesticide application when that application is performed in darkness as it would be infeasible for the inspector to note adverse effects under these circumstances. Additionally, the following scenarios often preclude visual monitoring during pesticide application:

1. Applications made from an aircraft
2. Applications made from a moving road vehicle when the Applicator is the driver
3. Applications made from moving watercraft when the Applicator is the driver
4. Applications made from a moving off-road wheeled or tracked vehicle when the Applicator is the driver.

4.2. Visual Monitoring Requirements for all Operators

Visual monitoring must also be conducted during any post-application surveillance, such as to determine the efficacy of the pesticide application. Visual monitoring of this type is required of all Operators but only if the Operator, be it the Applicator or the Decision-maker or both, performs post application surveillance in the course of business. The Department expects that post-application visual assessments are reasonably conducted on foot or from a stationary vehicle, although they might also be conducted from a moving vehicle, including a boat or plane, in certain circumstances.

5. Pesticide Discharge Management Plan (PDMP)

Any Decision-maker who is or will be required to submit an NOI and is not a small entity must

develop a PDMP, except for any pesticide applications made in response to a Declared Pest Emergency situation, as defined in the permit, or any Decision-maker who is or will be required to submit an NOI *solely* because of discharges to Waters of the State containing "Desirable Species", as defined in the permit. The Department defines a Decision-maker that is not a small entity as a *large entity* in the permit. Large entity Decision-makers must prepare the PDMP by the time the NOI is filed.

Any Decision-maker who is or will be required to submit an NOI and is a small entity (*i.e.*, is below the Small Business Association (SBA) size standard, as defined in 13 CFR. 121.201, or is a public entity serving a population of 10,000 or less), is not required to develop a PDMP.
Small entity Decision-makers are required to document activities as described in Part III.7.3 of this fact sheet. The Department recognizes that the SBA defines "small entities" as including government entities that serve populations of less than 50,000 persons. However, EPA's NPDES program has historically considered "major" municipal NPDES permits as those that serve greater than 10,000 persons (*i.e.*, with a wastewater treatment plant design of greater than one million gallons a day). 'Major NPDES' permittees have increased recordkeeping and public notice obligations over 'minor NPDES,' which is consistent with the intent for the permit to impose additional recordkeeping and reporting information only on these larger communities.

The PDMP itself does not contain effluent limitations; rather it constitutes a tool both to assist the Decision-maker in documenting what pest management measures it is implementing to meet the effluent limitations, and to assist the permitting/compliance authority in determining whether the effluent limitations are being met. Developing a PDMP helps Decision-makers ensure they have (1) taken steps to identify the pest problem, (2) evaluated pest management options, and (3) selected appropriate pest management measures to control pesticide discharges. A PDMP is a "living" document that requires reviews and must be kept up-to-date. Where pest management measures are modified or replaced to meet effluent limitations, such as in response to a Part III.E.1 triggering condition in the 17-PE, such changes must be documented in the PDMP. All changes to the PDMP must be made before the next pesticide application that results in a discharge, if practicable, or if not, no later than 90 days after any change in pesticide application activities. Failure of a Decision-maker to develop and maintain an up-to-date PDMP is a violation of the 17-PE. This recordkeeping violation is separate and distinct from a violation of any of the other substantive requirements in the permit (*e.g.*, effluent limitations, corrective action, monitoring, reporting, and state-specific requirements).

A PDMP must include identification of the pesticide discharge management team, a description of the pest problem, and a description of the pest management options evaluation. Decision-makers must also provide response procedures for spill response and adverse incident response. The size of a pest management area is determined by the Decision-maker responsible for and with the authority to conduct pest management activities. For example, the pest management area for a mosquito control district is the total area of the district. Once the plan is developed, the Decision-maker must maintain the plan thereafter for the duration of coverage under this general permit. For any Decision-maker for which the annual treatment area threshold triggers the NOI requirement (and the Decision-maker is a large entity), the Decision-maker must keep the plan up-to-date for the duration of permit coverage even if the annual treatment area subsequently falls below the annual treatment area threshold.

Decision-makers may choose to reference other documents, such as a pre-existing pest management plan or spill prevention and response plan, in the PDMP rather than recreating the same text in the PDMP. It is not required that a Decision-maker must have authored the pre-existing plan in order to use it. When referencing other documents, the Decision-maker is responsible for ensuring his/her PDMP and the other documents together contain all the necessary elements for a complete PDMP, as specified in Part III.D.1 of the 17-PE. In addition, the Decision-maker must ensure that a copy of relevant portions of those referenced documents is attached to the PDMP and is located on-site and it is available for review, consistent with Part III.D.3 of the 17-PE.

5.1. Contents of Your PDMP

The PDMP prepared under the 17-PE must meet specific requirements under Part 5.1 of the permit. Generally, Decision-makers must document the following: (1) a pesticide discharge management team; (2) a description of the pest management area and the pest problem; (3) a description of pest management options evaluation; (4) response procedures for spill response and adverse incident response; and (5) any eligibility considerations under other federal laws.

Pesticide Discharge Management Team

The 17-PE requires that a qualified individual or team of individuals be identified to manage pesticide discharges covered under the permit. Identification of a pesticide discharge management team ensures that appropriate persons (or positions) are identified as necessary for developing and implementing the plan. Inclusion of the team in the plan provides notice to staff and management (*i.e.*, those responsible for signing and certifying the plan) of the responsibilities of certain key staff for following through on compliance with the permit's conditions and limits.

The pesticide discharge management team is responsible for developing and revising the PDMP, implementing and maintaining the Pest Management Measures to meet effluent limitations, and taking corrective action where necessary. Team members should be chosen for their expertise in the relevant areas to ensure that all aspects of pest management are considered in developing the plan. The PDMP must clearly describe the responsibilities of each team member to ensure that each aspect of the PDMP is addressed. The Department expects most Decision-makers will have more than one individual on the team, except for those with relatively simple plans and/or staff limitations. The 17-PE requires that team members have ready access to any applicable portions of the PDMP and the permit.

Problem Identification

This section includes the pest problem description, action threshold(s), a general location map, and water quality standards.

1. Pest Problem Description.

The 17-PE requires that the PDMP include a description of the pest problem at the pest management area. A detailed pest management area description assists Decision-makers in subsequent efforts to identify and set priorities for the evaluation and selection of Pest Management Measures taken to meet effluent limitations set forth in Parts III.A and III.B of the 17-PE and in identifying necessary changes in pest management. The description must include identification of the target pest(s), source of the pest problem, and source of data used to identify the problem. The 17-PE allows use of historical data or other available data (*e.g.*, from another similar site) to identify the problem at your site. If you use other site data, you must document in this section why data from your site is not available or not taken within the past year and explain why the data is relevant to your site. Additionally, the pest management area descriptions should include any sensitive resources in the area, such as unique habitat areas, rare or listed species, or other species of concern that may limit pest management options.

2. Action Threshold(s)

The 17-PE requires that the PDMP include a description of the action threshold(s) established for the target pest, including a description of how they were determined and method(s) to determine when the action threshold(s) has been met. An action threshold is a level of pest prevalence (or other indicator) at which an Operator takes action to reduce the pest population.

3. General Location Map

The PDMP must also contain a general location map of the site that identifies the geographic boundaries of the area to which the plan applies and location of the waters of the United States. To improve readability of the map, some detailed information may be kept as an attachment to the site map and pictures may be included as deemed appropriate.

4. Water Quality Standards

Operators must identify any Tier 3 Waters (Outstanding National Resource Waters) and any water(s) impaired for a specific pesticide or its degradates to which there may be a discharge. Internet links to water quality maps are available at:
Tier 2:
http://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/HighQualityWatersMap.aspx
Impairments: http://mdewin64.mde.state.md.us/WSA/IR-TMDL/index.html

Description of Pest Management Measures Options Evaluation

The 17-PE requires that the PDMP include a description of the Pest Management Measures implemented to meet the applicable technology-based or water quality-based effluent limitations. The description must include a brief explanation of the Pest Management Measures used at the site to reduce pesticide discharge, including evaluation and implementation of the six management options (no action, prevention, mechanical/physical methods, cultural methods, biological control agents, and pesticides). Decision-makers must consider impact to non-target organisms, impact to water quality, feasibility, and cost effectiveness when evaluating and selecting the most efficient and effective means of Pest Management Measures to minimize pesticide discharge to Waters of this State.

All six management options may not be available for a specific use category and/or treatment area. However, the PDMP must include documentation of how the six management options, including combination of these options, were evaluated prior to selecting site specific Pest Management Measures. For the no action option, Operators should document the impact of this option without any current Pest Management Measures at the site. For the prevention management option, the Decision-maker should document the methods implemented to prevent new introductions or the spread of the pests to new sites, such as identifying routes of invasion and how these can be intercepted to reduce the chance of invasion. Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (*e.g.*, barriers) and/or sanitation methods, like wash stations, to prevent reintroduction by vehicles, personnel, etc. Some prevention management methods may fall under mechanical/physical or cultural methods, as well.

For the pesticide management option, Decision-makers should include a list of active ingredient(s) evaluated. Discussion should also identify specific equipment or methods that will prevent or reduce the risks to non-target organisms and pesticide discharges to Waters of this State.

Response Procedures

The following procedures necessary to minimize discharges must be documented in the PDMP:

1. Spill Response Procedures

The PDMP must document procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other release. In addition, the PDMP must include documentation of the procedures for

notification of appropriate facility personnel, emergency response agencies, and regulatory agencies.

2. Adverse Incident Response Procedures

In the PDMP, Decision-makers must document appropriate procedures for responding to an adverse incident resulting from pesticide applications. Decision-makers must identify and document the following:

- Procedures for responding to any adverse incident resulting from pesticide applications;
- Procedures for notification of the adverse incident, both internal to the Decision-maker's agency/organization and external;
- State/Federal permitting agency contacts with phone numbers;
- Name, location, and telephone of nearest emergency medical facility; and
- Name, location, and telephone of nearest hazardous chemical responder (including police and fire department).

Documentation to Support Eligibility Considerations under other Federal Laws

Decision-makers must keep, with the PDMP, documentation supporting their determination with regard to Part 1.1.2.4 of the 17-PE (Endangered and Threatened Species and Critical Habitat Protection).

Signature Requirements

The PDMP must be signed and certified in accordance with the signatory requirements in the permit. This requirement is consistent with standard NPDES permit conditions described in 40 CFR 122.22 and is intended to ensure that the Decision-maker understands his/her responsibility to create and maintain a complete and accurate PDMP. The signature requirement includes an acknowledgment that there are significant penalties for submitting false information.

5.2. Pesticide Discharge Management Plan Modifications.

The 17-PE requires that the PDMP be updated whenever any of the triggering conditions for corrective action in Part III.E.1 of the permit occur, or when a review following the triggering conditions in Part III.E.1 requires the Operator to revise his/her Pest Management Measures as necessary to meet the effluent limitations in the 17-PE. Keeping the PDMP up-to-date will help the Decision-maker ensure that the condition that triggered the corrective action does not reoccur. All changes to the PDMP must be made before the next pesticide application that results in a discharge, if practicable, or if not, no later than 90 days after any change in pesticide application activities or after an annual review.

It is important to note that failure to update the PDMP in accordance with Part III.D.2 of the 17-PE is a recordkeeping violation, not a violation of an effluent limit. For example, if the Decision-maker changes its spill response procedures, but fails to update its PDMP to reflect these changes, a recordkeeping violation will result. The Decision-maker must revise its PDMP to reflect the new procedures and include documentation of the corrective action (in accordance with the permit) to return to full compliance.

5.3. Pesticide Discharge Management Plan Availability.

The 17-PE requires that a copy of the current PDMP, along with all supporting maps and

documents, be kept at the address provided on the NOI. The PDMP and all supporting documents must be immediately available to representatives of the Department, EPA, a state, or local agency governing pesticide applications, as well as representatives of the United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) at the time of an on-site inspection or upon request. This requirement is consistent with standard NPDES permit conditions described in 40 CFR 122.41. Part III.D.3 of the 17-PE indicates that the Department may provide access to portions of your PDMP to a member of the public upon request. Confidential Business Information (CBI) may be withheld from the public, but consistent with 40 CFR Part 2, may not be withheld from the Department.

6. Corrective Action

The purpose of including corrective action requirements in the 17-PE is to assist this universe of NPDES permittees with effectively meeting technology-based and water-quality-based effluent limitations and implementing Pest Management Measures in the permit. Corrective action requirements apply from the time any authorized Operator begins discharging under the 17-PE. These requirements are not tied to submission of an NOI. Corrective actions in this permit are follow-up actions an Operator must take to assess and correct problems. They require review and revision of Pest Management Measures and pesticide application activities, as necessary, to ensure that these problems are eliminated and will not be repeated in the future. The 17-PE makes clear that the Operator is expected to assess why a specific problem has occurred and document what steps were taken to eliminate the problem. This approach will help Operators in complying with the requirements of the permit on a consistent basis. Compliance issues with some of the permit's requirements -- for instance, those related to reporting and recordkeeping and some of those related to operation and maintenance -- may be able to be corrected immediately simply by following already established procedures, and therefore, are not considered problems that trigger the corrective action provisions of the 17-PE.

It should be noted that a situation triggering corrective action is not necessarily a permit violation and, as such, may not necessarily trigger a modification of Pest Management Measures to meet effluent limitations. However, failure to conduct (and document) corrective action reviews in such cases does constitute a permit violation.

6.1. Situations Requiring Revision of Pest Management Measures

Operators are required to review and, as necessary, revise the selection and implementation of their Pest Management Measures to eliminate any of the following situations:

– An unauthorized release or discharge associated with the application of pesticides (*e.g.*, spill, leak, or discharge not authorized by this or another NPDES permit) occurs;
– Operators become aware, or the Department concludes, that Pest Management Measures are not adequate/sufficient for the discharge to meet applicable water quality standards;
– Any monitoring activities indicate failure to meet applicable technology-based effluent limitations in the permit;
– An inspection or evaluation by a Department official, or local, state, or EPA entity, determines that modifications are necessary to meet the non-numeric effluent limitations detailed in Part III.A of the 17-PE; or
– An Operator observes or is otherwise made aware (*e.g.*, a third party notification) of an adverse incident.

The Department considers the above situations to be of significant concern. Thus, the Department is requiring Operators to assess the cause of these situations, which may be affiliated with the Operator's discharge from the application of pesticides and to take any necessary steps to eliminate the situation and ensure that the situation will not be repeated in the future.

The purpose of Part III.E.1 of the 17-PE is to ensure compliance with corrective action requirements through increased accountability and oversight. The Department views ongoing assessment of the effectiveness of Pest Management Measures and corrective actions as integral to an effective pesticide management program. Written records associated with corrective action assessments must be kept with the other recordkeeping documentation required by this permit.

6.2. Corrective Action Deadlines

The 17-PE requires that corrective action be completed "before or, if not practicable, as soon as possible after the next pesticide application that results in a discharge." The Department emphasizes that this timeframe is not a grace period within which an Operator is relieved of any liability for a permit violation. The Department is adopting this flexible deadline to account for the variation in types of responses (*e.g.*, evaluate situation and select, design, install, and implement new or modified Pest Management Measures) that may be necessary to address any identified situations of concern. The Department recognizes that in rare cases a corrective action review may identify the need for substantial improvements to the Operator's Pest Management Measures, and does not want to limit the selection and implementation of such controls with an inflexible deadline. Another possibility is that the Department or the Operator may determine that further monitoring is needed under Part 6.3 of the 17-PE to pinpoint the source of the problem, and this monitoring may need to be conducted during future pesticide application activities. In the vast majority of cases, however, corrective action reviews will identify responses that can be taken quickly, either before the next pesticide application that results in a discharge or shortly thereafter.

6.3. Effect of Corrective Action

The occurrence of a situation described in Part III.E.1 of the 17-PE may, but does not necessarily, constitute a violation of the permit. The occurrence of a situation identified in Part 6.1 does require the Operator to immediately review and as necessary, revise the selection and implementation of their Pest Management Measures to eliminate the situation. Part III.E.3 of the 17-PE explains that taking corrective action does not absolve the Operator of any liability for a permit violation requiring that action, however, failure to take required corrective action will constitute an original or an additional permit violation. The Department will consider the appropriateness and promptness of corrective action in determining enforcement responses to permit violations. The Department may impose additional requirements and schedules of compliance, including requirements to submit additional information concerning the condition(s) triggering corrective action, additional site-specific water-quality based limitations, additional monitoring requirements, or other schedules and requirements more stringent than specified in this permit. Those requirements and schedules will supersede those of Parts III.E.1 and III.E.2 of the 17-PE if such requirements conflict.

6.4. Adverse Incident Documentation and Reporting

Part III.E.4 of the 17-PE requires Operators to take specific actions in response to identified adverse incidents which may have resulted from a discharge from the Operator's pesticide application. Namely, Operators are required to provide oral notice to the Department within 24 hours and then follow-up with a written report within 30 days of becoming aware of the adverse incident. The Department accepts the EPA definition of an "adverse incident", which is generally defined as any effect of a pesticide's use that is unexpected or unintended, in which there is evidence that a person or non-target organism has likely been exposed to a pesticide residue and suffered a toxic or adverse effect.

Part III.E.4.1 of the 17-PE requires Operators to call the appropriate State Incident Reporting Contact within 24 hours of any identified adverse incident and provide basic information about it. The purpose of this requirement is twofold: (1) to provide an opportunity for the Department to respond to these incidents as soon as reasonably can be expected, and (2) to provide a basis for potential corrective actions. The Department does not expect this initial notification to be detailed but merely a reporting of the date of the finding, a general discussion of the incident and a review of the necessity to conduct corrective action. The 17-PE requires Operators to document the information identified in Part 6.4.1, including the date and time that Department was notified and a description of any deviations from Part 6.4.a notification requirements based on nuances of the adverse incident. For example, an Operator may decide to notify multiple State contacts because of the severity of the adverse incident. This type of information should be included in the written documentation of the 24-hour notification as described below.

Part III.E.4.b of the 17-PE requires Operators to provide a written report of the adverse incident to the appropriate State office and to the State Lead Agency for pesticide regulation within 30 days of discovering the adverse incident. The adverse incident report must include the following information:

- Information required to be provided in Part III.E.4.a of the 17-PE;
- Date and time you contacted the Department notifying the State of the adverse incident;
- Location of incident, including the names of any waters affected and appearance of those waters (sheen, color, clarity, etc.);
- A description of the circumstances of the incident including species affected, number of individuals and approximate size of dead or distressed organisms;
- Magnitude of the effect (*e.g.*, aquatic square area or total stream distance affected);
- Quantity of pesticide applied and EPA registration number of pesticide product, intended use site (*e.g.*, banks, above, or direct to water), and method of application;
- Description of the habitat and the circumstances under which the incident occurred (including any available ambient water data for pesticides applied);
- Information on any laboratory tests performed and test results; and
- Actions to be taken to prevent recurrence of the incident.

Adverse incident information associated with discharges from the application of pesticides is useful to the Department because the information:

- Provides the Department with an indication of the effectiveness of the permit in controlling discharges to protect water quality, including data upon which the Agency may base future permit decisions (*e.g.*, modifications to or reissuance of this permit).
- May be considered when reviewing applications for registration of new pesticides that are chemically similar to existing pesticides, as well as re-evaluations of existing pesticides;
- May be considered in ecological risk assessment and during deliberations on risk management decisions;
- May be reviewed to determine trends that may indicate potential ecological impacts with an existing pesticide and/or to track improvements when mitigation measures are applied;
- Provides information on the nature, extent, and severity of incidents to Decision-makers, stakeholders, and the public; and

– Provides the Department with information on which to assess compliance with regulatory requirements, including documentation and reporting.

Currently, there is no database that includes adverse reporting from anyone other than the registrant under 6(a)(2) of FIFRA. EPA and the Department do not consider inclusion of adverse incident reporting in the NPDES permit to be a duplicative requirement to the FIFRA section 6(a)(2) requirements for registrant reporting of adverse incidents. This is because pesticide registrants are not likely to be directly covered under the 17-PE. Although some pesticide product labels may require that adverse incidents be reported, requiring the reporting of all adverse incidents and follow-up corrective actions may address the lack of a universal, mandatory legal duty for pesticide users to report adverse incidents, at least for the pesticide use patterns covered by the 17-PE.

The Department acknowledges that assessing and correcting adverse incidents may be complicated in certain instances. For example, symptoms associated with adverse incidents are often vague or mimic other causes which may lead to incorrect diagnoses. Thus, it may be difficult to identify and track chronic effects resulting from pesticides discharges. It may also be difficult to observe adverse effects because of limited visibility or access such as dead fish poisoned in a wetland under dense vegetation or in sparsely populated areas or because scavengers scatter or devour carcasses before discovery. It is important, however, to identify to the extent feasible situations where adverse effects occur where discharges from the application of pesticides also occur.

Immediately observable signs of distress or damage to non-target plants, animals and other macro-organisms within the treatment area may warrant concern for a possible adverse incident related to a discharge of pesticides during application. The Department acknowledges that some degree of detrimental impact to non-target species may occur and may be acceptable during the course of normal pesticide application. The Department expects Operators to use their best professional judgment in determining the extent to which non-target effects appear to be abnormal or indicative of an unforeseen problem associated with an application of pesticides.

During a visual inspection, Operators should watch for distressed or dead juvenile and small fish, washed up or floating fish, fish swimming abnormally or erratically, fish lying lethargically at the water surface or in shallow water, fish that are listless or nonresponsive to disturbance, the stunting, wilting, or desiccation of non-target submerged or emergent aquatic plants, and other dead or visibly distressed non-target organisms including amphibians, turtles, and macro-invertebrates. These observations must be noted unless they are deemed not to be aberrant (for example, distressed non-target fish are to be expected when conducting pest control with rotenone and non-target vegetation will be stressed near the target of contact herbicides). It should be noted that observation of these impacts does not necessarily imply that a pesticide has been misused or that there has been a permit violation or an instance of noncompliance, but may provide cause for further investigation of local water quality or reconsideration of Pest Management Measures.

Complete information concerning adverse impacts will aid the Department in any review of current or future pesticide use, adherence to Pest Management Measures, or effectiveness of these measures. Reporting of adverse incidents is not required under this permit in the following situations: (1) you are aware of facts that indicate that the adverse incident was not related to toxic effects or exposure from the pesticide application; (2) you have been notified in writing by the Department that the reporting requirement has been waived for this incident or category of incidents; (3) you receive information notifying you of an adverse incident but that information is clearly erroneous; (4) an adverse incident occurs to pests that are similar in kind to pests identified as potential targets on the FIFRA label. However, even for these situations, certain records must be kept on site by those Decision-makers who are required to submit NOIs, pursuant to Part III.F.3 and III.F.4 of the 17-PE.

6.5. Reportable Spills and Leaks

Part III.E.5 of the 17-PE requires Operators to call the appropriate State Incident Reporting Contact to report any spill or leak of a hazardous substance or oil into Waters of this State with 24 hours of becoming aware of the spill or leak. Part III.E.5 of the 17-PE requires Operators to document this notification within 30 days of becoming aware of such spill or leak. If the spill or leak triggers the notification in Part III.E.5 and results in an adverse incident, then Operators must report the incident per the guidelines in Part III.E.4.a and III.E.4.b of the 17-PE. If the spill or leak triggers the notification in Part III.E.5, but does not result in an adverse incident, then Operators must document and retain information outlined in Part III.E.5 within 30 days of becoming aware of the situation. This documentation provides a written record of what you reported to the Department orally. It should also include a description of the reporting system that will be used to alert responsible managers and legal authorities in the event of a future spill or leak and a description of preventive measures to prevent, contain, or treat spills and leaks of these materials. Part III.E.4.c of the 17-PE requires Operators to notify either the National Marine Fisheries Service or the United States Fish and Wildlife Service if the Operator becomes aware of an incident that may have resulted from a discharge from the pesticide application that adversely affects a federally-listed threatened or endangered species or its federally-designated critical habitat, or the Department of Natural Resources for any State-designated desirable species. This information will be used by the Department to ascertain compliance with permit conditions.

6.6. Documentation for Other Corrective Action

For any event described in Part III.E.1 of the 17-PE, other than for adverse incidents or reportable spills or leaks, immediate reporting to the Department is not required, but Operators must document basic information describing the event and the Operators' response to that event within 30 days. For triggering events in Part III.E.1, where the Operator determines that revision to Pest Management Measures is not necessary, the Operator must still document the review and the basis for this determination. The Department is not requiring Operators to submit this documentation to the State. Rather, the Department expects Operators to retain this information on-site and upon request, to make any such records available to the Department or any other Federal, state, or local regulatory agency governing pesticide applications. A summary of this information must also be included in the annual report for Operators subject to the annual reporting requirement.

7. Recordkeeping and Annual Reporting

The 17-PE requires all Decision-makers and Applicators to maintain certain records to help them assess performance of Pest Management Measures and to document compliance with permit conditions. Recordkeeping and reporting requirements apply from the time any authorized Operator begins discharging under the 17-PE. These requirements are consistent with Federal regulations at 40 CFR 122.41(j), but have been tailored to more closely reflect the requirements in the permit. The 17-PE requires a basic set of records to be maintained by all Decision-makers and Applicators, as well as separate requirements depending on the type of Operator (*i.e.*, Applicator, For-Hire Applicators, NOI submitting Decision-maker who is a small entity and NOI submitting Decision-maker who is a large entity). Part III.F of the 17-PE sets forth the recordkeeping requirements for each of these types of Operators. Operators can rely on records and documents developed for other programs, such as requirements under FIFRA, provided all requirements of the permit are satisfied.

The Department has found that it is appropriate and reasonable to require different records for different types of Operators, reasoning that the recordkeeping responsibilities assigned in the permit reflect the nature of involvement in pesticide application activities for the Operators described. The following sections describe the sets of records that the 17-PE requires different types of Operators keep, and enumerates the specific information items to be recorded.

7.1. Records to be kept by all Operators (all Decision-makers and all Applicators)

These records must be kept by *all* Operators, including those not submitting an NOI. Although this section is a universal requirement, these particular records are necessary only in the event of an adverse incident, the case that corrective action was required, or in the event of a discharge resulting from a spill or leak.

a. A copy of any Adverse Incident Reports (See Part III.E.4.b);
b. Rationale for any determination that reporting of an identified adverse incident is not required, consistent with allowances identified in Part 6.4.1.2;
c. A copy of any corrective action documentation (See Part 6.6); and,
d. A copy of documentation for any spill, leak, or other unpermitted discharge (See Part. III.E.5.b)

7.2. Records to be kept by all For-Hire Applicators

All Operators who are For-Hire Applicators, as defined in 17-PE, must keep the records listed above, as well as records that specifically document pesticide application equipment maintenance and details of the pesticide application event. Since Decision-makers who are not themselves performing pesticide applications are generally not able to record such information, The Department requires different recordkeeping requirements depending on the type of Operator.

a. Documentation of equipment calibration; and
b. Information on each treatment area to which pesticides are discharged, including:
    1. Description of each treatment area, including location and size (acres or linear feet) of treatment area and identification of any waters, either by name or by location, to which pesticide(s) are discharged;
    2. Pesticide use pattern(s) (*i.e.*, mosquito and other flying insects, weed and algae, animal pest, or forest canopy);
    3. Target pest(s);
    4. Documentation of any assessment of weather conditions in the treatment area prior to and during application to ensure application is consistent with all applicable federal requirements;
    5. Name of each pesticide product used including the EPA registration number;
    6. Quantity of each pesticide product applied to each treatment area;
    7. Pesticide application date(s); and
    8. Whether or not visual monitoring was conducted during pesticide application and/or post-application and if not, why not and whether any unusual or unexpected effects identified to non-target organisms.

7.3. Records to be kept by Small Entities, Submitting an NOI

Any Decision-maker that is required to submit an NOI and is below the SBA thresholds for small businesses or is a public entity serving a population of fewer than 10,000, is defined as a *small entity* in the permit. Small entities are required to keep a basic records set, outlined in Part III.F.3 of the 17-PE, all of which can be recorded on the Pesticide Discharge Evaluation Worksheet provided in the permit Appendix.

Decision-makers who are required to submit an NOI and who are defined as small entities are required to keep the following records at the address provided on the NOI, as identified in Part II.B of the 17-PE. A worksheet for documenting this information on each treatment area is provided in the Appendix of the 17-PE, Pesticide Discharge Evaluation Worksheet.

a. Copy of the NOI submitted to EPA, any correspondence exchanged between the Decision-maker and the Department specific to coverage under this permit, and a copy of the the Department acknowledgment letter with the assigned permit tracking number;
b. Documentation of equipment calibration (only if Decision-maker is also the Applicator);
c. Information on each treatment area to which pesticides are discharged, including:
    1. Description of treatment area, including location and size (acres or linear feet) of treatment area and identification of any waters of the United States, either by name or by location, to which pesticide(s) are discharged;
    2. Pesticide use pattern(s) (*i.e.*, mosquito and other flying insects, weed and algae, animal pest, or forest canopy);
    3. Target pest(s) and explanation of need for pest control;
    4. Description of pest management measure(s) implemented prior to the first pesticide application;
    5. Company name and contact information for pesticide applicator;
    6. Name of each pesticide product used including the EPA registration number;
    7. Quantity of each pesticide product applied to each treatment area;
    8. Pesticide Application Start Date;
    9. Pesticide Application End Date; and
    10. Whether or not visual monitoring was conducted during pesticide application and/or post-application and if not, why not and whether any unusual or unexpected effects identified to non-target organisms.

7.4. Records to be kept by Large Entities, Submitting an NOI

Any Decision-maker who is required to submit an NOI and is above the Small Business Administration (SBA) threshold for a small business or a public entity who serves a population of 10,000 or more is defined as a *large entity* in the permit. Large entities are required to keep the records listed in Part III.F.4 of the 17-PE. The Department expects that large entities will have a greater capability than small entities to record specific details of the pest treatment area, and is therefore requiring slightly more comprehensive recordkeeping. In addition, much of the records set for large entities are reflected in the annual report that these entities must submit. The reported information will allow the Department to better characterize the discharges resulting from pesticide applications in a variety of different circumstances.

Decision-makers who are to submit an NOI and are defined as large entities (as defined in the

permit)) must keep the following records as identified in Part III.F.4 of the 17-PE.

a. Copy of the NOI submitted to the Department, any correspondence exchanged between the Decision-maker and the Department specific to coverage under this permit, and a copy of the Department acknowledgment letter with the assigned permit tracking number;
b. A copy of the PDMP, including any modifications made to the PDMP during the term of this permit;
c. Copy of annual reports submitted to the Department;
d. Documentation of equipment calibration (only if Decision-maker is also the Applicator);
e. Information on each treatment area to which pesticides are discharged, including:
    1. Description of each treatment area, including location and size (acres or linear feet) of treatment area and identification of any waters of the United States, either by name or by location, to which pesticide(s) are discharged;
    2. Pesticide use pattern(s) (*i.e.*, mosquito and other flying insects, weed and algae, animal pest, or forest canopy);
    3. Target pest(s) and explanation of need for pest control;
    4. Action Thresholds;
    5. Method and/or data used to determine that action threshold(s) has been met;
    6. Description of pest management measure(s) implemented prior to the first pesticide application;
    7. Company name and contact information for pesticide applicator;
    8. Name of each pesticide product used including the EPA registration number;
    9. Quantity of each pesticide product applied to each treatment area;
    10. Pesticide application date(s); and
    11. Whether or not visual monitoring was conducted during pesticide application and/or post-application and if not, why not and whether any unusual or unexpected effects identified to non-target organisms.

7.5. Retention of Records

All required records must be prepared as soon as possible but no later than 14 days following completion of the associated activity. Operators must retain copies of these documents for a period of at least 3 years from the date their coverage under this permit expires or is terminated. The recordkeeping requirements are in Part III.F of the 17-PE.

The Department recommends that all Decision-makers keep records of acres or linear miles treated each calendar year for all applicable use patterns covered under this general permit. This record will help Decision-makers estimate when they will exceed the annual treatment area threshold (requiring submission of an NOI), or to complete an annual report if required.

7.6. Annual Reports

In addition to recordkeeping, the Department is requiring Decision-makers who are required to submit an NOI and are large entities as identified in Part III.F of the 17-PE to submit annual reports that contain basic information on their pesticide discharges to waters of the United States. An annual report form, along with instructions on how to complete it is available in Appendix D of the 17-PE.

The annual report must include information for the calendar year, with the first annual report required to include activities for the portion of the calendar year after the effective date of the NOI. If the effective date of the NOI is after December 1, the Operator is not required to submit an annual report for that first partial year but must submit annual reports thereafter, with the first annual report submitted also including information from the first partial year. When an Operator terminates permit coverage, as specified in Part II.F of the 17-PE, the Operator must submit an annual report for the portion of the year up through the date of the termination. The annual report is due no later than 45 days after the termination date, or February 15 of the following year, whichever is earlier.

This information in the annual report will be used by the Department to assess permit compliance and to determine whether additional controls on pesticide discharges are necessary to protect water quality. For example, these data will help the Department identify where pesticide discharges are occurring and the types of pesticides being discharged. The annual report provides specific information concerning the scope and nature of discharges permitted under the 17-PE.

It may be of interest to view annual reports that were submitted under EPA's PGP permit. A summary of data submitted in the annual reports is in the administrative record for the 2016 PGP. See *2012-2014 PGP Annual Report Data* document in the docket at EPA-HQ-OW-2015-0499.

The annual report is a summary of the pest control activities for each applicable use pattern and must contain:

a. Decision-maker's name and contact information;
b. NPDES permit tracking number(s);
c. Contact person name, title, e-mail address (if any), and phone number; and
d. For each treatment area, report the following information:
    1. Description of treatment area, including location and size (acres or linear feet) of treatment area and identification of any Waters of this State, either by name or by location, to which pesticide(s) are discharged;
    2. Pesticide use pattern(s) (*i.e.*, mosquito and other flying insects, weed and algae, animal pest, or forest canopy) and target pest(s);
    3. Company name(s) and contact information for pesticide applicator(s), if different from the Decision-maker;
    4. Total amount of each pesticide product applied for the reporting year by the EPA registration number(s) and by application method (*e.g.*, aerially by fixed-wing or rotary aircraft, ground based spray, etc.);
    5. Whether this pest control activity was addressed in a PDMP prior to pesticide application;
    6. If applicable, any adverse incidents as a result of these treatment(s), for incidents, as described in Part 6.4.1; and
    7. If applicable, description of any corrective action(s), including spill responses, resulting from pesticide application activities and the rationale for such action(s).

7.7. Annual Reporting for Any Decision-maker with Discharges to Waters of this State containing "Desirable Species", as defined in the permit, and who is a Small Entity

Any Decision-maker who is required to submit an NOI for discharges to Waters of this State containing "Desirable Species", as defined in the permit, and is a small entity, as defined in the permit, must submit an annual report to the Department. Large entities with discharges to Waters of this State

containing "Desirable Species", as defined in the permit, are required to submit annual reports consistent with Part III.F.6 of the 17-PE. Decision-makers must submit the annual report electronically through EPA's notice processing system (eNOI), available at https://www.epa.gov/npdes/pesticide-permitting, unless eNOI is otherwise unavailable or the Decision-maker meets the waiver requirements for submitting a paper annual report. Decision-makers waived from the requirement to use eNOI for annual report submission must certify on the paper annual report submitted to the Department the rationale for eligibility to use the waiver. The annual report must be submitted to the Department (either through eNOI or if eNOI is otherwise unavailable or the Decision-maker meets the eNOI waiver requirement, to the Department address identified in Part 8.1) no later than February 15 of the following year for all pesticide activities covered under this permit occurring during the previous calendar year.

When Decision-makers terminate permit coverage, as specified in Part II.F of the 17-PE, an annual report must be submitted for the portion of the year up through the date of termination. The annual report is due no later than February 15 of the next year.

For small entities, the annual report is a summary of the pest control activities for each applicable use pattern that results in a discharge to Waters of this State containing a "Desirable Species", as defined in the permit. For small entities, discharges to waters that do not contain "Desirable Species" do not need to be included in the annual report. The annual report must contain:

a. Decision-maker's name and contact information;
b. NPDES permit tracking number(s);
c. Contact person name, title, e-mail address (if any), and phone number; and
d. For each treatment area, report the following information:
    1. Description of treatment area, including location and size (acres or linear feet) of treatment area and identification of any Waters of this State, either by name or by location, to which pesticide(s) are discharged;
    2. Pesticide use pattern(s) (*i.e.*, mosquito and other flying insects, weed and algae, animal pest, or forest canopy) and target pest(s);
    3. Company name(s) and contact information for pesticide applicator(s), if different from the Decision-maker;
    4. Total amount of each pesticide product applied for the reporting year by the EPA registration number(s) and by application method (*e.g.*, aerially by fixed-wing or rotary aircraft, ground based spray, etc.);
    5. The approximate date of any discharge;
    6. If applicable, any adverse incidents as a result of these treatment(s), for incidents, as described in Part III.E.4.a; and
    7. If applicable, description of any corrective action(s), including spill responses, resulting from pesticide application activities and the rationale for such action(s).

7.8. Electronic Reporting Requirement

The 17-PE requires that all Notices of Intent (NOIs), Notices of Termination (NOTs), and annual reports be submitted electronically, unless EPA's electronic Notice of Intent system (eNOI) is otherwise unavailable or the Decision-maker has obtained a waiver from the requirement to use the eNOI system. Part III.G of the 17-PE outlines the conditions for obtaining a waiver. Electronic reporting improves efficiency for both Decision-makers and the Department and allows Decision-makers to obtain authorization to discharge in a timely manner (as is important for many pesticide applications). Previous experiences with electronic permit registrations suggest that the vast majority of Decision-makers are able to submit NOIs and reporting results electronically and most prefer electronic communication versus

submitting hard copy documents. In the 2011 PGP, electronic submittal of NOIs was encouraged but optional and Decision-makers submitted electronic NOIs for over 90% of covered discharges.

In those rare cases where Decision-makers are unable to report electronically, the 17-PE contains revised language that allows for hard copy submittal of information when the following exemptions apply: (1) If the Decision-maker is physically located in a geographic area (*i.e.*, zip code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission; or (2) If the Decision-makers have limitations regarding available computer access or computer capability. A Decision-maker who wishes to use paper submittals must submit a request to the Department as listed in Part 8 of the permit to obtain a waiver from submitting reports electronically. This revised language is also consistent with EPA's Electronic Reporting Rule (78 FR 46005).

8. The Department Contact and Mailing Addresses

This part of the 17-PE identifies contact information and mailing addresses for any applicable reporting requirements of the 17-PE. Most reporting will be to the Department, however in cases where Desirable Species are concerned, DNR is also listed as a contact.

9. Standard Permit Conditions

Federal regulations require that all NPDES permits contain the standard permit conditions specified in 40 CFR 122.41. Appendix B of the 2016 PGP incorporates those standard conditions with some minor revisions to more clearly address pesticide application operations covered under the 17-PE. Of note, Part IV.M explains the Operator's duty to comply with the conditions of the permit with failure to do so constituting a violation of the Clean Water Act.

10.Permit Appendices

A. Definitions and Acronyms

Appendix A of the 17-PE provides permit-specific definitions of statutory, regulatory, and other terms important for understanding its requirements. Any terms that are not listed in this definitions part have the meaning given to the terms by 40 CFR Part 122.2 (the definitions section of the NPDES regulations). To develop these definitions, EPA has, where possible, relied on existing definitions in other laws and regulations applicable to this universe of permittees in order to provide consistency with those laws and provide permittees with a familiar framework.

B. Pesticide Discharge Evaluation Worksheet

Part III.F.3 of the 17-PE requires Decision-makers who are required to submit an NOI and are small entities, as defined in Appendix A of the 17-PE, to complete and retain a worksheet for at least 3 years from when an Operator's coverage under the permit expires or is terminated.
Decision-makers are required to make this worksheet available to the Department, including an authorized representative of the Department, upon requires. Appendix B of the 17-PE contains a copy of the worksheet required to be retained by Decision-makers.

C. Adverse Incident Template

Part III.E.4 of the 17-PE requires Operators to: (1) provide oral notice to the Department within 24 hours, and (2) submit a written report within 30 days of becoming aware of an adverse incident which may have resulted from a discharge from the Operator's pesticide application. Adverse Incident, as defined in the 17-PE Appendix A, is an unusual or unexpected incident that an Operator has observed upon inspection or of which the Operator otherwise become aware, in which: (1) There is evidence that a person or non-target organism has likely been exposed to a pesticide residue, and (2) The person or non-target organism suffered a toxic or adverse effect. Appendix C of the 17-PE contains a copy of the information required to be submitted to the Department within 30 days of discovering the adverse incident.

D. Annual Report Template

Part III.F.6 of the 17-PE requires Decision-makers who: (1) are required to submit an NOI and are large entities, as identified in Part III.D of the 17-PE; and/or (2) discharge to Waters of this State containing "Desirable Species", to submit Annual Reports. The Annual Report must be submitted no later than February 15 of the following year for all pesticide activities covered under the 17-PE occurring during the previous calendar year. When Decision-makers terminate permit coverage, as specified in Part II.F of the 17-PE, an Annual Report must be submitted for the portion of the year up through the date of termination. Appendix D of the 17-PE contains a copy of the information required to be submitted with an Annual Report.

E. Desirable Species Procedures

The 17-PE specifies procedures to assist in protecting federally and state listed endangered and threatened species and its designated critical habitat, in addition to the other resources protected in the State, collectively referred to as desirable species. The Department is included the procedures similar to those included in the EPA's final PGP.

As discussed in section Part I.2.e of the 17-PE, coverage under this permit is available only for discharges and discharge-related activities that are not likely to adversely affect these desirable species, except as provided in Criterion B, C and, for 60 day, D. For these discharges, the Operator must document that discharges meet these conditions by certifying eligibility under one of Criteria A-F. (Note that Operators not otherwise required to submit an NOI do not need to do so merely to certify under Criterion A, which indicates that discharges will not occur to Waters of this State where desirable species are present.) Appendix E contains a four-step process that must be followed for determining whether an Operator is eligible for permit coverage, prior to submittal of the NOI. In order to become eligible for this permit, each Operator must determine its compliance with one of six criteria (A – F). If Operators cannot determine if they meet one of the eligibility criteria related to desirable species, the Operator cannot submit an NOI to gain coverage under the 17-PE. In these instances, the Operator may consider applying to the Department for an individual NPDES permit.