Attachment E – Notice of Intent

WATER QUALITY ORDER NO. 2013-0002-DWQ
GENERAL PERMIT NO. CAG990005

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item A. New Applicator B. Change of Information: WDID# 2 482047002
C. ☐ Change of ownership or responsibility: WDID# _____

II. DISCHARGER INFORMATION

A. Name Travis Air Force Base			
B. Mailing Address 60th CES/CEIE 411 Airman Dr, Building 570			
C. City Travis AFB	D. County Solano	E. State CA	F. Zip 94535-2001
G. Contact Person Mr. Seth Merdler	H. E-mail address seth.merdler@us.af.mil	I. Title Environmental Engineer	J. Phone 707-424-7516

III. BILLING ADDRESS (Enter Information ***only*** if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. E-mail address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Algaecide and aquatic herbicides are used to treat (check all that apply):

1. [X] Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
   Name of the conveyance system: Duck Pond, various drainage channels and ditches, Union Creek
2. [ ] Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
   Owner's name: _____
   Name of the conveyance system: _____
3. [x] Directly to river, lake, creek, stream, bay, ocean, etc.
   Name of water body: Union Creek

B. Regional Water Quality Control Board(s) where treatment areas are located (REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): Region **2**
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: Algae, aquatic weeds (surface and submerged), and weeds in and adjacent to surface water. Perennial Pepperweed, Arundo, and Stinkwort in dry vernal pools.

B. Algaecide and Aquatic Herbicide Used: List Name and Active ingredients

Glyphosate (Aquamaster®, Rodeo®, AquaPro®,Glypro®); Diquat (Reward®); Triclopyr (Renovate®); Imazapyr (Habitat®),Fluridone (Sonar®}; Endothall (Cascade®, Hydrothol 191®); Sodium Carbonate Peroxyhydrate (GreenClean®} and 2,4 D (Weedar®).

C. Period of Application: Start Date January 1 End Date December 31

D. Types of Adjuvants Used: Various nonionic surfactants including, but not limited to: Activator 90®, Surphtac®, No Foam A® and Agri-Dex®.

VI. AQUATIC PESTICIDE APPLICATION PLAN

Has an Aquatic Pesticide Application Plan been prepared and is the applicator familiar with its contents?
[X] Yes [ ] No

If not, when will it be prepared? _____

VII. NOTIFICATION

Have potentially affected public and governmental agencies been notified? [ ] Yes [X] No

VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?
[ ] YES [ ] NO [X] NA

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the General Permit, including developing and implementing a monitoring program, will be complied with."

A. Printed Name: Brian L. Sassaman

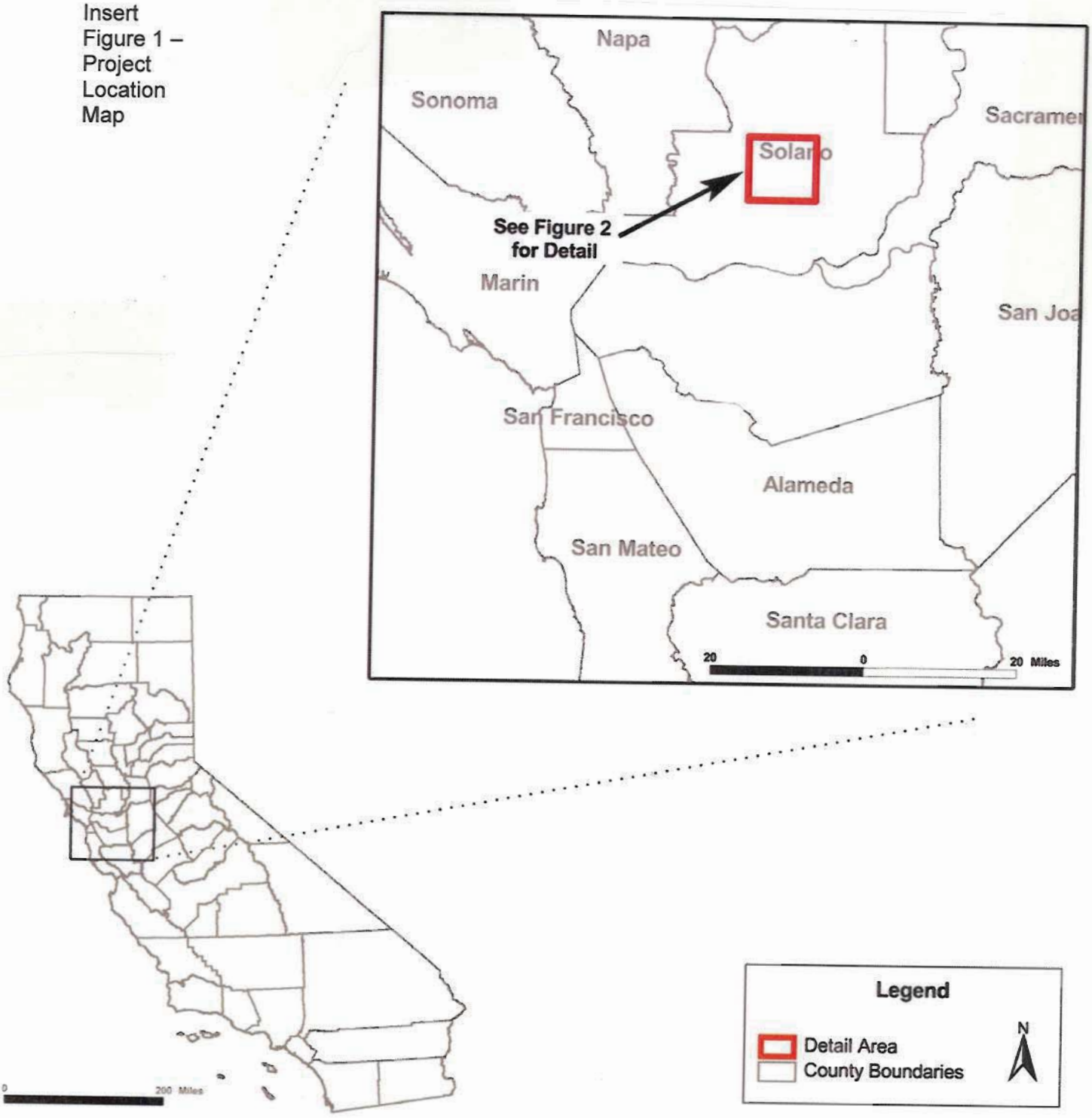
B. Signature: Brian L. Sassaman **Date:** 31 Oct 2018

C. Title: Flight Chief, Installation Management

XI. FOR STATE WATER BOARD STAFF USE ONLY

WDID:	**Date NOI Received:**	**Date NOI Processed:**
Case Handler's Initial:	**Fee Amount Received:** **$**	**Check #:**
☐ **Lyris List Notification of Posting of APAP**	**Date** _____	**Confirmation Sent** _____

Insert Figure 1 – Project Location Map



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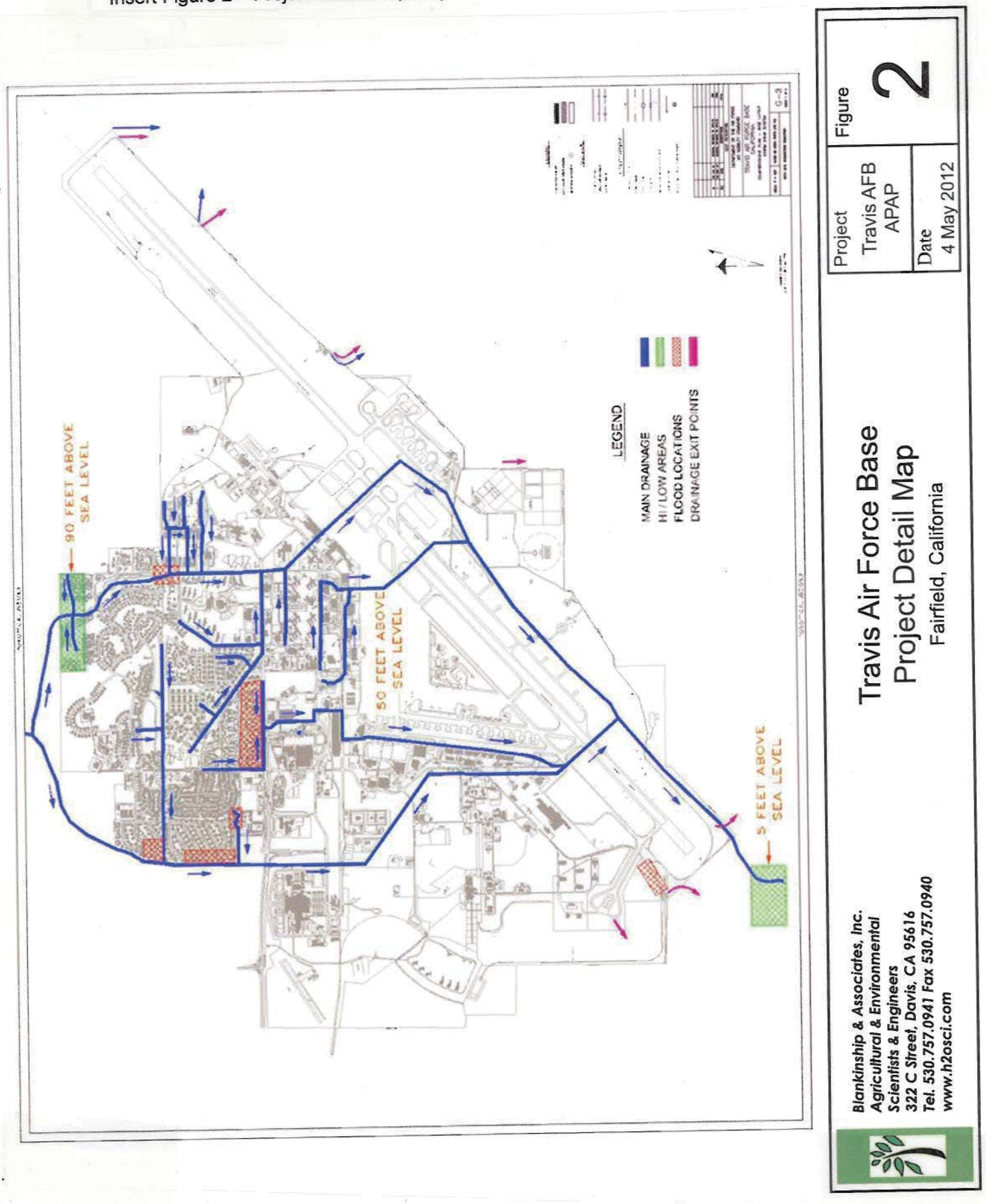
Travis Air Force Base Project Location Map

Fairfield, California

Project	Figure
Travis AFB APAP	1
Date: 16 May 2011	

Insert Figure 2 – Project Detail Map.



FINAL

Aquatic Pesticide Application Plan (APAP)

Environmental Services for Air Force Civil Engineer Center (AFCEC)
Travis Installation Support Team (Travis IST)

Fairfield, California

December 2013

Modified 26 September 2017

Prepared for:

U.S. Army Corps of Engineers

U.S. Army Corps of Engineers, Ft. Worth District
819 Taylor Street
Fort Worth, Texas 76102-0300

Contract: W912BV-12-D-0017, Task Order: DY01

Prepared by:

10955 Westmoor Drive, Suite 400
Westminster, CO 80021

CERTIFICATION

AQUATIC PESTICIDE APPLICATION PLAN

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed and Agreed:

12/27/2013

X Brian L. Sassaman

BRIAN L. SASSAMAN, GS-13, DAF
Flight Chief, Installation Management
Signed by: SASSAMAN.BRIAN.L.1080522793

CERTIFICATION

AQUATIC PESTICIDE APPLICATION PLAN

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. T am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed and Agreed:

Corinne D. Mark/ E CPESC, QSD/P
California License C6 1097
Exp. 12/21114

t z/18f13

Date

STATEMENT OF LIMITATIONS

AQUATIC PESTICIDE APPLICATION PLAN

The Aquatic Pesticide Application Plan prepared for the previous permit Water Quality Order 2004-0009-DWQ that includes background information, design basis, and other data has been furnished to URS Group, Inc. (URS) by the Travis Air Force Base, which URS has used in preparing this Plan. URS has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information.

Opinions presented herein apply to existing and reasonably foreseeable site conditions at the time this Plan was prepared. These opinions cannot apply to site changes of which URS is unaware and has not had the opportunity to review. Changes in the condition of this property may occur with time due to natural processes or works of man at the site or on adjacent properties. Changes in applicable standards may also occur as a result of legislation or the broadening of knowledge. Accordingly, this Plan may be invalidated, in whole or in part, by changes beyond our control.

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ACRONYMS AND ABBREVIATIONS

Term	Description
°C	degrees Celsius
µg/L	microgram per liter
µS/cm	microSiemens per centimeter
2,4-DCP	2,4-dichlorophenol
AFB	air force base
AMPA	aminomethylphosphonic acid
APAP	Aquatic Pesticide Application Plan
BASH	bird/wildlife/ air strike hazard
BMP	best management practice
Cal OSHA	California Occupational Safety and Health Administration
CalEPA	California Environmental Protection Agency
CHQ	2,4-dichloroanisole, chlorohydroquinone

COC	chain of custody
DPR	Department of Pesticide Regualtions
EPA	United States Environmental Protection Agency
FB	field blank

ACRONYMS AND ABBREVIATIONS

Term	Description
FD	field duplicate
H_2O_2	hydrogen peroxide
H_2SO_4	sulfuric acid
HCl	hydrochloric acid
HDPE	high-density polyethylene
HNO_3	nitric acid
IPMC	Installation Pest Management Coordinator
IPMP	Integrated Pest Management Plan
L	liter
MB	method blank
mg/L	milligrams per liter
MRP	monitoring and reporting program
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric unit
PCA	Pest Control Advisor
QA	quality assurance
QC	quality control
RPD	relative percent difference
SIP	State Implementation Policy
SU	standard unit
TCP	3,5,6-trichloro-2-pyridinol
TKN	total Kjeldahl nitrogen
TMP	3,5,6-trichloro-2-methoxypridine
URS	URS Group, Inc.
USGS	United States Geological Survey
VOA	volatile organic analyte

1.1 INTRODUCTION

1.2 Regulatory Background

This Aquatic Pesticide Application Plan (APAP) was developed to comply with the requirements of the State of California's Water Quality Order 2013-0002-DWQ, the Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States (U.S.) from Algae and Aquatic Weed Control Applications Permit CAG990005 (General Permit), adopted by the State Water Resource Control Board on March 5, 2013.

The General Permit regulates point-source discharge to waters of the United States of aquatic pesticides (algaecides and aquatic herbicides) used for algae and aquatic weed control. Herbicides act on plants only and are a subset of pesticides. The General Permit regulates the point-source discharges of residues resulting from pesticide applications using products containing 2,4-D, acrolein, copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, sodium carbonate peroxyhydrate, chlorsulfuron, and triclopyr-based algaecides and aquatic herbicides, and adjuvants containing ingredients represented by the surrogate nonylphenol.

The General Permit covers only discharges of algaecides, and aquatic herbicides that are currently registered for use in California by the California Department of Pesticide Regulation (DPR), or that become registered for use and contain the above-listed active ingredients and ingredients represented by the surrogate of nonylphenol.

The General Permit does not cover indirect or non-point source discharges, whether from agricultural or other applications of pesticides to land that may be conveyed in stormwater run-off.

1.3 Facility Description

Travis Air Force Base (AFB) is located east of Fairfield in Solano County, California. Travis AFB is a fully operational U.S. Department of Defense Base with active duty personnel on station from the U.S. Air Force, Navy, and Army, as well as civilian and contract personnel. Travis AFB is bordered by the City of Fairfield on the west, and farmland/pasture to the north, south and east. The topography of the land is essentially flat. Travis AFB encompasses a total of approximately 6,400 acres. Travis AFB is in Regional Water Board Region 2. Travis AFB receives most of its surface water by way of Union Creek or drainage from on-site runoff (see Figure 1 and Figure 2).

1.4 APAP Overview

The Notice of Intent (NOI) submitted to the State Water Resources Control Board (State Water Board) concurrent with this APAP uses the Travis AFB's *Integrated Pest Management Plan* (IPMP). The IPMP employs the techniques of "threshold triggers" for action. Travis AFB's application of aquatic herbicides uses these thresholds as action limits for work initiation.

This APAP describes the project site, aquatic plant and algae nuisances, aquatic pesticide products expected to be used, the monitoring and reporting program (MRP), and best management practices (BMPs) to be followed, as well as the other conditions addressed in the General Permit, Section VIII C, titled *Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan.*

The General Permit, Section VIII C, *Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan* requires the APAP to contain the following elements:

1) Description of the water system to which algaecides and aquatic herbicides are being applied.
2) Description of the treatment area in the water system.
3) Description of types of weed(s) and algae that are being controlled and why.
4) Algaecide and aquatic herbicide products or types of algaecides and aquatic herbicides expected to be used and if known their degradation byproducts, the method in which they are applied, and if applicable, the adjuvants and surfactants used.
5) Discussion of the factors influencing the decision to select algaecide and aquatic herbicide applications for algae and weed control;.
6) If applicable, list the gates or control structures to be used to control the extent of receiving waters potentially affected by algaecide and aquatic herbicide application and provide an inspection schedule of those gates or control structures to ensure they are not leaking.
7) If the Discharger has been granted a short-term or seasonal exception under State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Policy) Section 5.3 from meeting acrolein and copper receiving water limitations, provide the beginning and ending dates of the exception period, and justification for the needed time for the exception. If algaecide and aquatic herbicide applications occur outside of the exception period, describe plans to ensure that receiving water criteria are not exceeded because the Dischargers must comply with the acrolein and copper receiving water limitations for all applications that occur outside of the exception period.
8) Description of monitoring program.
9) Description of procedures used to prevent sample contamination from persons, equipment, and vehicles associated with algaecide and aquatic herbicide application.
10) Description of the BMPs to be implemented. The BMPs shall include, at the minimum:
    a) Measures to prevent algaecide and aquatic herbicide spill and for spill containment during the event of a spill.
    b) Measures to ensure that only an appropriate rate of application consistent with product label requirements is applied for the targeted weeds or algae.
    c) The Discharger's plan in educating its staff and algaecide and aquatic herbicide applicators on how to avoid any potential adverse effects from the algaecide and aquatic herbicide applications.
    d) Discussion on planning and coordination with nearby farmers and agencies with water rights diversion so that beneficial uses of the water (irrigation, drinking water supply, domestic stock water, etc.) are not impacted during the treatment period.
    e) A description of measures that will be used for preventing fish kill when algaecides and aquatic herbicides will be used for algae and aquatic weed controls.
    11) Examination of Possible Alternatives. Dischargers should examine the alternatives to algaecide and aquatic herbicide use to reduce the need for applying algaecides and herbicides. Such methods include:

a) Evaluating the following management options, in which the impact to water quality, impact to non-target organisms including plants, algaecide and aquatic herbicide resistance, feasibility, and cost effectiveness should be considered:

   i) No action.

   ii) Prevention.

   iii) Mechanical or physical methods.

   iv) Cultural methods.

   v) Biological control agents.

   vi) Algaecides and aquatic herbicides.

   If there are no alternatives to algaecides and aquatic herbicides, Dischargers shall use the minimum amount of algaecides and aquatic herbicides that is necessary to have an effective control program and is consistent with the algaecide and aquatic herbicide product label requirements.

b) Using the least intrusive method of algaecide and aquatic herbicide application.

c) Applying a decision matrix concept to the choice of the most appropriate formulation.

This APAP is organized to address the 11 elements listed above.

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2.0 WATER SYSTEM DESCRIPTION

Travis AFB occupies approximately 6,200 acres, and receives most of its surface water by way of Union Creek or drainage from on-site authorized stormwater runoff. Union Creek splits into two forks prior to entering Travis AFB property. The eastern fork enters Travis AFB and flows into Duck Pond before flowing underground to outfalls toward the southern portion of Travis AFB. Water in Duck Pond can be released into the underground stormwater system by way of two control valves into the downstream portions of the eastern fork of Union Creek. The western fork flows through Travis AFB, rejoins the eastern fork, and exits near the southwest corner of Travis AFB at designated outfalls.

Water is also collected by Travis AFB's authorized stormwater drainage channels. The open stormwater drainage channels are earth-lined conveyances designed and maintained to move water to Union Creek and off Travis AFB.

Vernal pools and swales are found within the grassland habitat as well. Vernal pools are shallow depressions or small, shallow ponds that fill with water during the rainy season (primarily from precipitation with some flow from immediate upland areas) and then dry out during the spring (March – June), becoming completely dry by late spring or early summer. This hydrologic regime supports the unique plant and animal communities characteristic of vernal pools. The vernal pools on Travis AFB are classified as northern claypan vernal pools. These pools occur on deep alluvial soils. Vernal swales are ecologically and floristically related to vernal pools; however, vernal swales are drainage ways or poorly defined depressions that are seasonally inundated, holding standing water for relatively short periods. These wetlands are scattered throughout the installation, but are generally absent in the highly developed central and northern areas. Perhaps the most high-quality vernal pools are in the northwest portion of the base by the old Aero Club. Over 600 vernal pools and swales have been identified on Travis AFB. These sites are either single pools, or hydrologically associated pool clusters, varying in size from less than 50 square feet to one acre (TAFB 2016).

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3.0 TREATMENT AREA DESCRIPTION

All areas in Travis AFB where aquatic vegetation meets treatment thresholds are subject to treatment.

Application and treatment areas are earth-lined authorized stormwater drainage channels, Union Creek, Duck Pond, and vernal pools. Travis AFB maintains channels that range from approximately 5 to 25 feet wide and up to 5 feet deep. Duck Pond has a surface area of approximately 1.5 acres, and is up to approximately 12 feet deep.

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4.0 WEEDS AND ALGAE DESCRIPTION

Weeds (native and non-native) found in Travis AFB's water bodies include riparian, emergent, floating, and submerged aquatic vegetation and algae. Vegetation includes:

- Eurasian watermilfoil (*Myriophyllum spicatum*) (invasive non-native)
- Cattails (*Typha spp.*) (native)
- Bulrush/tulle (*Scirpus spp.*) (native)
- Smartweed (*Polygonum spp.*) (native and non-native species potentially present)
- Duckweed (*Lemna spp.*) (native)
- Filamentous algae
- Perennial pepperweed (*Lepidium latifolium L.*) (invasive non-native)
- Arundo (*Arundo donax*) (invasive non-native)
- Stinkwort (*Dittrichia graveolens*) (invasive non-native)

The presence and location of these weeds and other plants throughout Travis AFB varies from year to year.

On the main base, inefficient conveyance of stormwater and management of wildlife habitat as part of a naturally-functioning wetland and stream system can create a bird/wildlife aircraft strike hazard (BASH), which is of critical concern to Travis AFB. Stormwater drainage channels, Union Creek and Duck Pond are prone to infestation by algae that can be submersed, floating or emergent aquatic weeds, especially cattails and watermilfoil. The presence of these native and non-native weeds can slow or stop the flow of water, preventing efficient drainage and resultant off-site movement of water. This drainage impediment can potentially create a flood hazard or may negatively impact efficient stormwater drainage through Travis AFB, as well as increasing BASH concerns. However, in some cases these tules, cattails, and watermilfoil may act in a positive way to slow down water flow and deposit sediment as a BMP for stormwater pollution prevention control. Travis AFB faces challenges in achieving a balanced solution, weighing these opposing concerns.

The current habitat management for BASH is limited to terrestrial habitat control. Union Creek includes terrestrial habitat control and emergent vegetation control. Travis AFB also needs to reduce BASH habitat concerns in and around its water conveyances by controlling the growth of aquatic and riparian vegetation through the use of pesticides under the General Permit.

Duck Pond, located on the main base, is maintained for recreational fishing and as an aesthetic feature for personnel on base. Travis AFB plans to manage algae and submersed aquatic vegetation (rooted and unrooted) through the use of pesticides to maintain the beneficial aesthetic and use of Duck Pond for fishing in a manner compatible with Military Mission requirements.

Perennial pepperweed and Arundo are ranked High by the California Invasive Plant Council (CaliPC) and invades wetlands and vernal pools, rapidly forming large, dense stands that displace desirable vegetation. Stinkwort is ranked moderate by CaliPC. At Travis AFB, the federally endangered Contra costa goldfields (*Lasthenia conjugens*) occurs in vernal pools and is directly threatened by existing populations of perennial pepperweed. Other federally listed species potentially affected include vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), and California tiger salamander (*Ambystoma californiense*) all of which occur in vernal pool habitat at Travis AFB. Control is required to meet conservation recovery goals for these species at Travis AFB per the Integrated Natural Resources Management Plan (INRMP, TAFB 2016), required by the Sikes Act (16 U.S.C 670).

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5.0 AQUATIC PESTICIDES AND ADJUVANTS USED AND APPLICATION METHODS

Table 1 summarizes the aquatic pesticide products used by Travis AFB:

Table 1. Aquatic Herbicides Available for Use.

Herbicide[1]	Method	Degradation Byproducts[2]
Fluridone	Submersed boom, or spreader.	· n-methyl formamide (NMF) and 3-trifluoromethyl benzoic acid
Endothall	Submersed boom, spreader (granules), handgun or boom sprayer.	· carbon, hydrogen, and oxygen
Diquat	Submersed boom, handgun (Power sprayer), or boom sprayer.	· None
Triclopyr	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· 3,5,6-trichloro-2-pyridinol (TCP) · 3,5,6-trichloro-2-methoxypridine (TMP)
Glyphosate	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· Aminomethylphosphonic acid (AMPA)
2,4-D	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· 1,2,4-benzenetriol, 2,4-dichlorophenol (2,4-DCP), 2,4-dichloroanisole, chlorohydroquinone (CHQ), · 4-chlorophenol and volatile organics.
Imazapyr	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· Pyridine hydroxy-dicarboxylic acid, · pyridine dicarboxylic acid (quinolinic acid), and nicotinic acid.
Penoxsulam	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· As penoxsulam breaks down, twelve degradation products are created. Six of these are more persistent in the environment than penoxsulam itself: · BSTCA: 3-[[[2-(2.2-difluoroethoxy)-6-(trifluoromethyl)phenyl]-sulfnyl]animo]-1H-1,2,4-triazole-5-carboxylic acid · 2-animo TCA: 2-animo-1,2,4-triazole carboxylic acid · 5-OH-XDE-638 (5-OH-penoxsulam): 2-(2,2-difluoroethoxy)-N-(5,6-dihydro-8-methoxy-5-oxo[1,2,4]triazolo[1,5-c]pyrimidin-2-yl)-6- · SFA: 2-(2,2-difluoroethoxy)-N-(iminomethyl)-6-(trifluoromethyl)-benzenesulfonamide · sulfonamide: 2-(2,2,-difluoroethoxy)-6-(trifluormethyl)-benzenesulfonamide · 5,8-diOH: 2-(2,2,-Difluoroethoxy)-t-trifluoromethyl-N-(5,8-dihydroxy-[1,2,4]triazolo[1,5-c]pyrimidin-2-yl)benzenesulfonamide
Imazamox	Backpack sprayer, handgun (Power sprayer), or boom sprayer.	· Nicotinic acid and di- and tricarboxylic acids
Sodium Carbonate Peroxyhydrate	Handgun, boom sprayer (liquid), or spreader (granules).	· Hydrogen peroxide (H_2O_2) and sodium carbonate

Table 1. Aquatic Herbicides Available for Use.

Herbicide[1]	Method	Degradation Byproducts[2,3]

Notes:
[1]Adjuvants are not included in this list and will be selected as appropriate based on herbicide of choice and must be labeled for aquatic use.
[2]Source: Wisconsin Department of Natural Resources Chemical Fact Sheets (http://dnr.wi.gov/lakes/plants/factsheets/)
[3]Source: Strek 1998

All pesticide applications are made in strict accordance with the product label. For example, an application of endothall, which is a liquid, to lakes/ponds for the control of algae will be made with a handgun spray nozzle at a rate calibrated to deliver the desired target concentration of material per acre-foot of water in the pond, as calculated per the label for algae control. An additional example is for the control of emergent vegetation in drainage channels. In this case, an application of Glyphosate tank mix will be made by working upstream with a backpack sprayer, handgun, or boom sprayer. These applications are not completed if wind speed exceeds a threshold that may result in unintentional drift, as prescribed on the label.

The herbicides used to control algae and submersed aquatic vegetation (rooted and unrooted) in standing/flow-through water bodies (e.g., Duck Pond) mentioned above will not control tules/cattails/bulrushes because they are not designed to do so and are ineffective.

The quantity of aquatic herbicide product required is determined by the Pest Manager who follows the label directions in making a recommendation. The amount of material used is highly variable and depends on the type, location, and density of weeds, the weed area to be treated, amount of water flowing in a canal, temperature and hardness of the water. All these factors are considered by the Pest Manager prior to making an application.

As appropriate, the DPR-licensed Pest Control Advisor (PCA) will consider and use adjuvants (surfactants, emulsifiers, pH control agents, drift retardants, etc.) to increase the efficacy of the aquatic herbicide so that the least possible material is used in the most efficient manner to control algae and aquatic weeds. Adjuvants also reduce the unintentional movement of aquatic herbicide applications to off-site locations that may have sensitive receptors. Travis AFB is in regular contact with the manufacturer's representatives to gain knowledge and assess new or modified adjuvants that will improve efficacy or further decrease off-target movement.

6.0 DISCUSSION OF FACTORS INFLUENCING AQUATIC HERBICIDE SELECTION

The selection of and decision to use an aquatic herbicide is based on the recommendation of the Installation Pest Management Coordinator (IPMC) or contracted PCA. The IPMC should consult with Travis AFB Headquarters, Air Mobility Command's Medical Entomologist, the Natural Resources Manager, and a PCA. These consultations will consider a variety of control options and application areas. These options may include mechanical and cultural techniques that, alone or in combination with chemical controls, are the most efficacious and protective of the environment. Evaluating all potential control methods is part of Travis AFB's integrated pest management approach; therefore, a non-pesticide control method such as mechanical removal (raking out weeds or chaining) may be selected as part of a test program. A more detailed description is presented in Section 12 of this document.

Additionally, the IPMC will not select environmentally sensitive areas such as vernal pools and/or seasonal swales to apply pesticides (except the perennial pepperweed, arundo, and stinkwort control program's use of glyphosate, imazapyr, and triclopyr managed by the Natural Resource Manager), which could provide suitable habitat to support federally-listed species, including branchiopods and breeding habitat for California tiger salamander. The Natural Resources Manager will identify all sensitive areas, buffer zones, and may conduct a biological survey prior to pesticide application for areas identified on the Aquatic Pesticide Application Areas map as requiring a site briefing.

Effective treatment of aquatic weeds by Travis AFB is determined by the use of the principles of integrated pest management and by the application of threshold criteria listed in Travis AFB's IPMP (Travis AFB, 2011- 2016). For example, if a population of weeds equals or exceeds a certain threshold, an aquatic herbicide application is made.

Thresholds are met when weeds/algae create problematic habitat or cause problems and/or concerns in:

- Stormwater channels and/or any other drainage conveyances.
- Typically associated with impediments to flow.
- BASH concerns and/or sediment build-up in Travis AFB channels.
- Endangered Species Act (16 U.S.C 1531 et seq.) listed species

Algaecide and aquatic herbicide applications may also be made prior to threshold exceedance. For example, based on:

- Predicted growth rate
- Density
- Historical weed trends
- Seasonal hot weather
- Water availability
- Experience/process knowledge

Weeds may reasonably be predicted to cause future problems. Accordingly, they may be treated soon after emergence or when appropriate based on the selected herbicide to be used. Even though weeds may not be an immediate problem at this phase, treating them before they mature reduces the amount of aquatic herbicide needed. Younger weeds are more susceptible and

there is less plant mass to target. Generally, treating weeds earlier in the growth cycle results in less total aquatic herbicide used.

Selection of appropriate aquatic herbicide(s) and rate of application performed is based upon:

- Identification of the algae or aquatic weed
- Its growth state
- The appearance of that weed on the product label as a plant it controls
- Vernal pool water levels and phenology of the weed and native species in the pool

7.0 GATES AND CONTROL STRUCTURES

Two control valves can be used to release water from Duck Pond into the underground stormwater system downstream portions of the eastern fork of Union Creek. As applicable or necessary, Travis AFB staff will close valves during an algaecide or aquatic herbicide application to control the extent, if any, that receiving waters will be affected by residual algaecides or aquatic herbicides.

To evaluate the presence of leaks, valves within the treatment area will be inspected prior to and during the application. Figure 3 shows the form used to document this inspection. If leaks develop on closed valves, they will be stopped as soon as practicable.

Water does not flow out of vernal pools thus no gates or control structures exist or are needed. Water evaporates or is used/absorbed by the plants and soil.

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8.0 STATE IMPLEMENTATION POLICY (SIP) SECTION 5.3 EXCEPTION

Travis AFB is not planning to use copper or acrolein to control aquatic vegetation. As such, a SIP Section 5.3 Exception is not necessary. If Travis AFB decides to use copper or acrolein, it may apply for a SIP Section 5.3 Exception; if an exception is granted, this section will be amended to include the information as outlined in the required California Environmental Quality Act documentation. This amendment will be noted in the Annual Report.

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9.0 MONITORING AND REPORTING PROGRAM (MRP)

The General Permit requires that dischargers comply with the MRP outlined in Attachment C of the General Permit. The MRP must be designed to address two key questions:

- Question 1: Does residual algaecide and aquatic herbicide discharge cause an exceedance of receiving water limitations?
- Question 2: Does the discharge of residual algaecides and aquatic herbicides, including active ingredients, inert ingredients, and degradation byproducts in any combination cause or contribute to an exceedance of the "no toxics in toxic amount" narrative toxicity objective?

The monitoring program in this APAP must also describe the tasks and time schedules in which these two key questions will be addressed. Monitoring must take place at locations that are being planned to be applied or may be applied as described in this APAP.

The General Permit Fact Sheet in Attachment D of the General Permit describes the goals of the MRP as follows:

1. Identify and characterize algaecide or aquatic herbicide application projects conducted by the Discharger.

2. Determine compliance with the receiving water limitations and other requirements specified in this General Permit.

3. Measure and improve the effectiveness of the APAP.

4. Support the development, implementation, and effectiveness of BMPs.

5. Assess the chemical, physical, and biological impacts on receiving waters resulting from algaecide or aquatic herbicide applications.

6. Assess the overall health and evaluate long-term trends in receiving water quality.

7. Demonstrate that water quality of the receiving waters following completion of resource or weed management projects are equivalent to pre-application conditions.

8. Ensure that projects that are monitored are representative of all algaecide or aquatic herbicide and application methods used by the Discharger.

Attachment C of the General Permit provides MRP guidelines that Travis AFB will use to meet the goals listed above; the MRP in this APAP is consistent with the above goals.

9.1 Monitoring Procedures

Monitoring must take place for all active ingredients at locations that are described and scheduled in this APAP except within vernal pools for projects managed by the Natural Resources Manager. Monitoring must include frequent and routine visual, physical, and chemical monitoring on a pre-determined schedule including background monitoring, event monitoring, and post-event monitoring, as summarized in the table below.

Monitoring for discharges to vernal pools will not follow the same procedures as other applications as it will not be applied to open water, thus Question 1 and 2 are not expected to apply. Active ingredients will be applied to dry jurisdictional vernal pools (~May-Oct) that fill with water after the rainy season starts (~November), 1-6 months after herbicide application. Common weed monitoring procedures will include vegetation sampling to determine target and non-target plant impacts and herbicide effectiveness. Sampling of open water in treated vernal pools 1-6 months after herbicide treatment may be considered if vegetation sampling results do not yield beneficial results. If such sampling occurs, it will follow Table 2 and a report will be produced and submitted with other sampling results per the timeline in Section 9.2.1. Travis AFB's new Endangered Species Act (ESA) Programmatic Biological Opinion (PBO) allows Travis to conduct herbicide applications near habitat suitable for federally listed species (e.g. vernal pools) and requires conformance to minimization measures. In situations where this APAP applies (application to vernal pools), additional project analysis under the PBO will be required and submitted to USFWS for approval, ensuring compliance with the ESA.

Table 2. Monitoring Requirements.

Sample Type	Constituent/ Parameter	Units	Sample Method	Minimum Sampling Frequency	Sample Type Requirement	Required Analytical Test Method
Visual	Monitoring area description (pond, lake, open waterway, channel, etc.)	Not applicable	Visual Observation	1	Background, event and post-event monitoring.	Not Applicable
	Appearance of waterway (sheen, color, clarity, etc.)					
	Weather conditions (fog, rain, wind, etc.)					
Physical	Temperature[2]	ºF	Grab[4]	5	Background, event and post-event monitoring.	6
	pH[3]	Number				
	Turbidity[3]	NTU				
	Electric Conductivity[3] at 25 degrees Celsius (°C)	µmhos/cm				
Chemical	Active Ingredient[7]	µg/L	Grab[4]	5	Background, event and post-event monitoring.	6
	Nonylphenol[8]	µg/L				
	Hardness (if copper is monitored)	mg/L				
	Dissolved Oxygen[2,9]	mg/L				

Table 2. Monitoring Requirements.

Sample Type	Constituent/ Parameter	Units	Sample Method	Minimum Sampling Frequency	Sample Type Requirement	Required Analytical Test Method

[1]All applications at all sites.
[2]Field testing.
[3]Field or laboratory testing.
[4]Samples shall be collected at 3 feet below the surface of the water body or at mid water column depth if the depth is less than 3 feet.
[5]Collect samples from a minimum of six application events for each active ingredient in each environmental setting (flowing water and non-flowing water) per year, except for glyphosate. If there are less than six application events in a year, collect samples during each application event for each active ingredient in each environmental setting (flowing water and non-flowing water). If the results from six consecutive sampling events show concentrations that are less than the receiving water limitation/trigger for an active ingredient in an environmental setting, sampling shall be reduced to one application event per year for that active ingredient in that environmental setting. If the yearly sampling event shows exceedance of the receiving water limitation/trigger for an active ingredient in an environmental setting, then sampling shall return to six application events for that active ingredient in each environmental setting. For glyphosate, collect samples from one application event from each environmental setting (flowing water and non-flowing water) per year.
[6]Pollutants shall be analyzed using the analytical methods described in the Code of Federal Regulations Title 40 Section 136.
[7]2,4-D, acrolein, dissolved copper, diquat, endothall, fluridone, glyphosate, imazamox, imazapyr, penoxsulam, and triclopyr.
[8]This item is required only when a surfactant is used.
[9]Water Quality Order 2013-0002-DWQ requires levels of dissolved oxygen to be maintained below the Regional Water Board Basin Plan's dissolved oxygen objectives for receiving water after application.

9.1.1 Visual Monitoring

Visual monitoring will be performed for all algaecide and aquatic herbicide applications at all sites and be recorded by qualified personnel.

Figure 3, the Aquatic Pesticide Application Log or its equivalent, or Figure 4, an Aquatic Herbicide Field Monitoring and Sampling Form for Static Water, or its equivalent, or Figure 5, an Aquatic Herbicide Field Monitoring and Sampling Form for Moving Water will be used. Records from this monitoring will be kept with the application records of Travis AFB.

9.1.2 Monitoring Locations and Frequency

Water quality sampling for glyphosate will be conducted for one application event from each environmental setting (flowing water [i.e., moving] and non-flowing water [i.e., static]) per year. No water quality sampling is required for applications of products that contain sodium carbonate peroxyhydrate. For application of all other algaecides and aquatic herbicides listed on the Permit (except application to vernal pools managed by the Natural Resources Manager), Travis AFB will collect samples from a minimum of six application events for each active ingredient in each environmental setting per year. If there are less than six application events in a year for an active ingredient, Travis AFB will collect samples for each application event in each environmental setting. If the results from six consecutive sampling events show concentrations that are less than the applicable receiving water limitation/trigger in an environmental setting, Travis AFB will reduce the sampling frequency for that active ingredient to one per year in that environmental setting. If the annual sampling shows exceedances of the applicable receiving water limitation/trigger, Travis AFB will be required to return to sampling six applications the next year, and until sampling may be reduced again. Sites will be chosen to represent the

variations in treatment that occur, including algaecide or aquatic herbicide use, hydrology, and environmental setting, conveyance or impoundment type, seasonal, and regional variations. The exact location(s) of sample site(s) will be determined after site scouting and a decision to make an aquatic herbicide application are made per Travis AFB's IPM approach. Figure 3 is the form used to document pesticide application. Figure 4 and Figure 5 are the forms used to document monitoring and sampling for static or moving water applications.

9.1.3 Sample Locations

Sampling will include background, event, and post-event monitoring as follows, except for vernal pool applications as it will not be applied to open water:

Background Monitoring

In moving water, the background sample is collected upstream of the treatment area at the time of the application event, or in the treatment area within 24 hours prior to the start of the application.

For static water, the background sample is collected in the treatment area within 24 hours prior to the start of the application.

Event Monitoring

The event monitoring sample for flowing water is collected immediately downstream of treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

The event monitoring sample for non-flowing (static) water is collected immediately outside the treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area.

The location and timing for the collection of the event monitoring sample may be based on a number of factors including, algae and aquatic weed density and type, flow rates, size of the treatment area, and duration of treatment.

Post-Event Monitoring

The post-event monitoring sample is collected within the treatment area within one week after the application.

One full set of three samples (i.e., background, event monitoring and post-event monitoring) will be collected during each treatment from the representative site(s) in Travis AFB according to the monitoring frequency and locations described earlier.

Additionally, one field duplicate (FD) and one field blank (FB) will be collected and submitted for analysis for each analyte, once per year. The FD and FB samples will be collected at the event site immediately after application. Figures 3 through 5 are the field sampling forms to be used.

Once Travis AFB determines that an aquatic herbicide application is needed, the exact locations of sample collection will be determined using guidance presented above.

9.1.4 Sample Collection

If the water depth is 6 or more feet, the sample will be collected at a depth of 3 feet. If the water depth is less than 6 feet, the sample will be collected at the approximate mid-depth. Samples will be collected in a manner that minimizes the amount of suspended sediment and debris in the sample and minimizes loss of monitored constituent. Sample collection locations will be altered if access or other problems are encountered in the field.

9.1.5 Field Measurements

In conjunction with sample collection, temperature will be measured during or shortly after sample collection. Turbidity, electrical conductivity/salinity, pH, and dissolved oxygen may be measured in the field using field meters as available or analyzed in the laboratory.

9.1.6 Sample Preservation and Transportation

If preservation is required for the monitored constituent, the preservative will be placed in the sample by the container analytical laboratory or vendor prior to sample collection. Once a sample is collected and labeled it will immediately be placed in a dark, cold (4°C) environment, which is typically an ice chest with ice. Delivery to the laboratory typically occurs on the same day of sample collection.

9.1.7 Sample Analysis

All samples requiring laboratory analyses will be collected and analyzed by a laboratory certified for such analyses by the California Department of Public Health. All analyses will be conducted in accordance with the latest edition of *Guidelines Establishing Test Procedures for Analysis of Pollutants* (Guidelines), promulgated by the U.S. Environmental Protection Agency (EPA) per the Code of Federal Regulations Title 40 Section 136. Field analysis for the parameters of temperature, dissolved oxygen, electrical conductivity, and pH may be performed using a portable multi-parameter meter (YSI brand or equivalent) with a sufficiently long probe cable. The meter(s), if used, will be maintained and calibrated at regular intervals according to the manufacturer specifications. Table 3 shows the constituents that each sample must be analyzed for.

Table 3. Required Sample Analysis.

Analyte	EPA Method	Reporting Limit	Hold Time (Days)	Container	Chemical Preservative
Temperature[1]	Field test with calibrated portable instrument or 170.1	N/A	N/A	N/A	N/A
Turbidity[2]	Field test with calibrated portable instrument or 180.1	0.02 NTU	2	100 mL HDPE	None
Electrical Conductivity[2]	Field test with calibrated portable instrument or 120.1	1 µS/cm at 25°C	28	100 mL HDPE	None

Table 3. Required Sample Analysis.

Analyte	EPA Method	Reporting Limit	Hold Time (Days)	Container	Chemical Preservative
pH[2]	Field test with calibrated portable instrument or 150.1 or 150.2	0.1 SU	Immediately	100 mL HDPE	None
Dissolved Oxygen[2]	Field test with calibrated portable instrument or 360.1 or 360.2	1.0 mg/L	Immediately	250 mL Amber Glass	None
TKN, Total Nitrogen, Nitrite (NO_2), and Nitrates (NO_3)	351.1-4 or 353.1	1.0 mg/L	28 days	100 mL HDPE	H_2SO_4 OR HCL, cold
*Copper (total)	200.7	1 µg/L	180	250 mL HDPE	pH<2 w/HNO_3
Hardness	130.1 or 130.2	5 mg/L	1	250 mL HDPE	None
*Triclopyr	8151-modified	0.1 µg/L	7	1L Amber Glass	None
*Endothall	548.1	40 µg/L	7	2x40 mL VOA	HCI
*2,4-D	8151	0.5 µg/L	7	1L Amber Glass	None
*Diquat	549.1 or 549.2	40 µg/L	7	500 mL Amber HDPE	H_2SO_4
*Fluridone	NCL-SOP	0.1 µg/L	7	2 x40 mL VOA	None
*Glyphosate	547	0.5 µg/L	14	2 x40 mL VOA or other glass container	Sodium Thiosulfate
*lmazapyr	8321	1 µg/L	7	1L Amber Glass	None
*Penoxsulam	NCL-SOP	0.1 mg/L	7	2 x40 mL VOA	None
Imazamox	NCL-SOP	1 mg/L	7	2 x40 mL VOA	None
*Nonylphenol[3]	NCL SOP 272	1 µg/L	7	IL Amber Glass	None
*Sodium Carbonate Peroxvhvdrate	Spectrophotometer (for H_20_2)	1.0 mg/L	7	250 mL HDPE	None

Notes:

	Must be sampled for at every sample site for all herbicide applications.
	Must be sampled for at applications to lakes/ponds to confirm the absence of copper.
	Must be sampled for at every sample site for herbicide applications when the active ingredient (herbicide) is listed on the• label of the pesticide applied.

*Signifies active ingredient (herbicide). Chemical analysis is only required if the active ingredient(s) is used in treatment.

[1]Must be field measured.

[2]May be field or laboratory measured.

[3]Required only when nonylphenol surfactant is used.

Table 3. Required Sample Analysis.

Analyte	EPA Method	Reporting Limit	Hold Time (Days)	Container	Chemical Preservative

µg/L – microgram per liter
µS/cm- microSiemens per centimeter
°C – degrees Celsius
H_2SO_4 – sulfuric acid
HCl – hydrochloric acid
HDPE- high density polyethylene (plastic) bottle
HNO_3 – nitric acid
L – liter
mg/L- milligram per liter
mL – milliliter
N/A - Not applicable
NTU – nephelometric unit
SU - Standard Units
TKN - Total Kjeldahl nitrogen
VOA - Volatile Organic Analyte vial

9.2 Reporting Procedures

Mr. Seth Merdler is the contact for this project. He can be reached at (707) 424-7516, and will be responsible for receiving, reviewing, and providing feedback on project reports to the Water Board.

9.2.1 Annual Report

An annual report for each reporting period, from January 1 to December 31 will be prepared and submitted by March 1 of the following year. In years when no aquatic herbicides are used, a letter stating that no applications were applied will be submitted in lieu of an annual report. The Annual Report will be submitted to the appropriate Deputy Director and Regional Board Executive Officer. All reports submitted in response to the Water Quality Order will comply with the provisions stated in the Standard Provisions (Attachment B) and Monitoring and Reporting Program (Attachment C), of the General Permit. The Annual Reports will contain the following information:

- An executive summary discussing compliance or violation of the General Permit, and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with algaecide and aquatic herbicide applications.
- A summary of monitoring data, including the identification of water quality improvements, or degradation as a result of the algaecide or aquatic pesticide application, if appropriate, and recommendations for improvements to the APAP (including proposed BMPs and monitoring program based on the monitoring results). All receiving water monitoring data will be compared to receiving water limitations and receiving water monitoring triggers.

Travis AFB will collect and retain all information on the previous reporting year. When requested by the Deputy Director or Executive Officer of the applicable San Francisco Regional Water Board, Travis AFB will submit the annual information collected, including:

1. An Executive Summary discussing compliance or violation of the Permit and the effectiveness of the APAP to reduce or prevent the discharge of pollutants associated with herbicide applications.

2. A summary of monitoring data, including the identification of water quality improvements or degradation as a result of algaecide or aquatic herbicide application, if appropriate, and recommendations for improvement to the APAP (including proposed BMPs) and monitoring program based on the monitoring results. All receiving water monitoring data must be compared to applicable receiving water limitations and receiving water monitoring triggers.
3. Identification of BMPs and a discussion of their effectiveness in meeting the Permit requirements.
4. A discussion of BMP modifications addressing violations of the Permit.
5. A map showing the location of each treatment area.
6. Types and amounts of aquatic herbicides used at each application event during each application.
7. Information on surface area and/or volume of treatment area and any other information used to calculate dosage, concentration, and quantity of each aquatic herbicide used.
8. Sampling results shall indicate the name of the sampling agency or organization, detailed sampling location information (including latitude and longitude or township/range/section if available), detailed map or description of each sampling area (address, cross roads, etc.), collection date, name of constituent/parameter and its concentration detected, minimum levels, method detection limits for each constituent analysis, name or description of water body sampled, and a comparison with applicable water quality standards, description of analytical quality assurance/quality control (QA/QC) plan. Sampling results shall be tabulated so that they are readily discernible.
9. Summary of Aquatic Pesticide Application Logs (Figure 3).

9.2.2 24-Hour and 5-Day Reporting

The discharger and or applicator will orally report any non-compliance. This includes any unexpected or unintended effect of the use of an algaecide or aquatic herbicide that may danger health or the environment. This information will be provided orally within 24 hours from the time the discharger or applicator becomes aware of the circumstances. A written report of the non-compliance will be provided within 5 days of the time the discharger and or applicator becomes aware of the noncompliance.

9.3 Sampling Methods and Guidelines

The purpose of this section is to present methods and guidelines for the collection and analysis of samples necessary to meet the APAP objective of assessing adverse impacts, if any, to beneficial uses of water bodies treated with algaecides and aquatic herbicides.

This section describes the techniques, equipment, analytical methods, and quality assurance and quality control procedures for sample collection and analysis. Guidance for the preparation of this section included:

- NPDES Storm Water Sampling Guidance Document (EPA 1992)
- Guidelines and Specifications for Preparing Quality Assurance Project Plans (EPA 1980)
- U.S. Geological Survey, National Field Manual for the Collection of Water Quality Data (USGS 1995).

9.3.1 Surface Water Sampling Techniques

All surface water samples will be grab samples and will be collected with an open-faced container placed directly into the water. If the water depth is 6 feet or greater the sample will be collected at a depth of 3 feet or approximately half the water depth, if possible. If the water depth is less than 6 feet the sample will be collected at the approximate mid-depth. As necessary, an intermediary sampling device (e.g., long-handled cup sampler or Van-Dorn style sampler) will be used for locations that are difficult to access. Appropriate cleaning technique is discussed in Section 9.3.4.

During collection, the samples will be collected in a manner that minimizes the amount of suspended sediment and debris in the sample. Surface water grab samples will be collected directly by the sample container or by an intermediary container in the event that the sample container cannot be adequately or safely used or the container includes a chemical preservative. Intermediary samplers will either be HDPE (plastic), stainless steel or glass. Stainless steel and glass containers will be washed thoroughly and triple rinsed before collection of the next sample. Alternatively, disposable HDPE or glass intermediary sample containers can be used once, and be discarded after sampling.

9.3.2 Sample Containers

Clean, empty sample containers with caps will be supplied in protective cardboard cartons or ice chests by the subcontractor laboratory. The containers will be certified clean by either the laboratory or the container supplier. To ensure data quality control, the sampler will use the appropriate sample container as specified by the laboratory for each sample type. Sample container type, holding time, and appropriate preservatives are listed in Table 3. Each container will be affixed with a label indicating a discrete sample number for each sample location. The label will also indicate the date and time of sampling and the sampler's name.

9.3.3 Sample Preservation

Samples will be collected with bottles containing the correct preservative(s), refrigerated at 4°C stored in a dark place, and transported to the analytical laboratory. Preservatives shall be added to sampling bottles before sampling occurs by the laboratory supplying the containers and performing the analysis, as necessary. Refer to Table 3.

9.3.4 Sampling Equipment Cleaning

In the event that sampling equipment will be used in more than one location, the equipment will be thoroughly cleaned with a non-phosphate cleaner, triple-rinsed with distilled water, and then rinsed once with the water being sampled prior to its first use at a new sample collection location.

9.3.5 Sample Packing and Shipping

All samples are to be packed and transported the day the samples are collected to provide ample time for samples to be analyzed within the required holding time.

Ice will be included in ice chests containing samples that require temperature control. Samples will be packaged in the following manner:

1. Sample container stickers will be checked for secure attachment to each sample container.

2. The sample containers will be placed in the lined ice chest. Bubble-wrap, suitable foam padding, or newspaper will be placed between sample containers to protect the sample containers from breakage during shipment and handling.

3. The chain of custody (COC) will be placed inside a plastic bag and placed inside the ice chest. The COC will indicate each unique sample identification name, time and place of sample collection, the sample collector, the required analysis, turnaround time, and location to which data will be reported.

4. The ice chest will then be readied for pick-up by a courier or delivered directly to the laboratory.

9.4 Field Sampling Operations

9.4.1 Field Logbook

A logbook will be maintained by members of the sampling team to provide a record of sample location, significant events, observations, and measurements taken during sampling. Entries will be signed and dated. Field data will be recorded with permanent ink. Field logbooks are intended to provide sufficient data and observations to enable project team members to reconstruct events that occurred during the sampling. The field logbook entries will be legible, factual, detailed, and objective. See Figure 3 for the form used to record relevant field data.

9.4.2 Alteration of Sampling Techniques

It is possible that actual field conditions may require a modification of the procedures outlined here. Specifically, water levels, weather, other environmental parameters and hazards including stream flow, rainfall and stormwater use may pose access and/or sampling problems. In such instances, variations from standard procedures and planned sampling locations and frequencies will be documented by means of appropriate entry into the field logbook.

9.4.3 Flow Estimation

A flow meter calibrated according to the manufacturer's directions will be p1aced as close to the center of the stream or creek as possible and a reading taken in feet per second. Alternatively, the time a common floating object (branch, leaf, etc.) travels a known distance will be estimated and represented in feet per second. A minimum distance of approximately 25 feet will be used. Flow estimation measurements will be made for all moving water sampling locations.

9.4.4 Chain-of-Custody (COC)

The COC record will be employed as physical evidence of sample custody. The sampler will complete a COC record to accompany each sample shipment from the field to the laboratory. The COC will specify: time, date, location of sample collection, specific and unique sample number, requested analysis, sampler name, required turnaround time, time and date of sample transaction between field and laboratory staff, preservative, if any, and name of receiving party at the laboratory.

Corrections to the COC will be made by drawing a line through, initialing, and dating the error, and entering the correct information. Erasures are not permitted.

Upon receipt of the samples, laboratory personnel will check to ensure that the contents of the ice chest(s) are accurately described by the COC. Upon verification of the number and type of samples and the requested analysis, a laboratory representative will sign the COC, indicating receipt of the samples.

The COC record form will be completed in duplicate. Upon sample delivery, the original copy will be left with the laboratory and a copy will be kept by the sampler, either electronically (as a scan) or three-hole punched, and placed in the field logbook.

9.4.5 Sample Label

The laboratory will often provide sample labels. The label will contain information on the specific project (i.e., Travis Air Force Base APAP), the unique individual sample identification number (i.e., Duck Pond-BG), the date and time the sample was collected, and the name of the sampler (i.e. S. Burkholder).

Prior to sampling, the water resistant label will be completed with waterproof ink and will be affixed to the appropriate container.

9.4.6 Corrections to Documentation

Documents will not be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement or correction. If an error is made on a document used by an individual, that individual will make corrections by making a line through the error and entering the correct information. Corrections will be initialed and dated.

9.4.7 Document Control

A central file location will be established and used to store documentation such as the field logbook and laboratory data. These documents will be stored by Travis AFB's Pest Manager who is responsible for compliance, in accordance with this APAP.

9.4.8 Sample Kit

Prior to departing to the field to collect samples, the following equipment will be prepared for use:

- Laboratory-supplied sampling bottles (one set for each sample to be collected plus spares, plus QA/QC samples)
- Sample labels (one for each sample container to be collected plus spares)
- Permanent, water-proof ink marker
- COC forms
- Field data logbook
- Flow meter (optional for moving water applications)
- Ziploc-type bags for paperwork

- Non-phosphate cleaner (e.g., Liqui-Nox®)
- Deionized or distilled water
- Ice or blue ice packs
- Clear mailing tape
- Plastic ice chest(s)
- Grab pole
- Gloves
- Rubber boots
- Stop or wrist watch

9.5 Quality Assurance/Quality Control (QA/QC)

The purpose of QA/QC is to assure and control the quality of data generated during sample collection and analysis as described earlier in this document. Quality assurance and quality control are measured in a variety of ways, as described below.

9.5.1 Precision

Precision is a measure of the reproducibility of measurements under a given set of conditions. It is a quantitative measure of the variability of a group of measurements compared to the average value of the group and is expressed as the relative percent difference (RPD). Sources of error in precision (imprecision) can be related to both laboratory and field techniques. Specifically, lack of precision is caused by inconsistencies in instrument setting, measurement and sampling techniques and record keeping.

Laboratory precision is estimated by generating analytical laboratory matrix spike (MS) and matrix spike duplicate (MSD) sample results and calculating RPD. In general, laboratory RPD values of less than 25 percent will be considered acceptable.

Field precision is estimated by collecting field duplicates (FDs) in the field and calculating RPD. In general, field RPD values of less than 35 percent will be considered acceptable. Refer to the discussion of FDs in Section 9.6.5.

9.5.2 Accuracy

Accuracy is a measure of how close data are to their true values and is expressed as percent recovery (%R), which is the difference between the mean and the true value expressed as a percentage of the true value. Sources of error (inaccuracy) are the sampling process, field contamination, preservation, handling, sample matrix effects, sample preparation, analytical techniques and instrument error.

Laboratory accuracy is estimated using reference standards and matrix spike (MS) and matrix spike duplicates (MSD) samples. Acceptable accuracy is between 75 and 125 percent. Refer to the earlier discussion of MS and MSD. Field accuracy cannot be measured as true field values are not known.

9.5.3 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid measurements. The completeness objective is that sufficiently valid data is generated to allow for submittal to the Water Board. Completeness will be assessed by comparing the number of valid sample results to the number of samples collected. The objective for completeness is 80 percent.

9.5.4 Representativeness

Representativeness refers to a sample or group of samples that reflects the predominant characteristics of the media at the sampling point. The objective in addressing representativeness is to assess whether the information obtained during the sampling and analysis represents the actual site conditions.

9.5.5 Field Duplicate (FD)

The purpose of an FD is to quantify the precision, or reproducibility, of the field sampling technique. It involves the duplication of the technique used for a particular field sample collection method and the subsequent comparison of the initial and duplicate values. This comparison is measured as the relative percent difference (RPD). RPD is calculated as follows:

RPD = [(Sample 1 – Sample 2) / (Average of Samples 1 and 2)] X 100

An acceptable field RPO value is :S 35 percent.

The FD is collected at the same time as the actual field sample and one FD per year will be collected.

9.5.6 Field Blank (FB)

The purpose of the FB is to assure that the field sampling technique, equipment, or equipment cleaning technique or materials do not impart a false positive or negative result during the collection of the sample. An FB will be prepared with distilled water or equivalent and allowed to come into contact with the sampling device in a manner identical to the actual sample. The only acceptable values for analytes in the FB is less than the RL for the compounds of interest, or an expected, previously determined, background value. An FB will be collected at the same time as the actual field sample and one FB per year will be collected.

Table 4 summarizes the field and laboratory QA/QC samples that will be analyzed

Table 4. Summary of QA/QC Sample Analysis, Actions, and Validation Criteria.

QA/QC Sample	Action Required	QA/QC Parameter Estimated	Value Required for Valid Data
Field			
Field Blank	Collect in Field	False Negative/Positive	0 or no more than 20 percent of known Background
Field Duplicate	Collect in Field	Precision	RPO :S 35 percent
Laboratory			

Table 4. Summary of QA/QC Sample Analysis, Actions, and Validation Criteria.

QA/QC Sample	Action Required	QA/QC Parameter Estimated	Value Required for Valid Data
Matrix Spike	Prepared by Laboratory	Accuracy	75 < %R < 125 percent
Matrix Spike Duplicate	Prepared by Laboratory	Precision	RPD < 25 percent
Method Blank	Prepared by Laboratory	False Negative/Positive	0 or no more than 20 percent of known Background

9.5.7 Laboratory Quality Assurance and Quality Control

Laboratory precision and accuracy will be monitored by a series of laboratory-generated quality control samples. As long as sufficient sample volume is collected and submitted to the laboratory, no additional effort is required by field activities to generate laboratory quality control samples. Each set of field samples will have associated with it the following set of laboratory quality control samples.

Method Blank (MB)

The purpose of an MB is to assure that the analytical technique does not impart a false positive result during the preparation or analysis of the sample. An MB will be prepared by the laboratory from high purity distilled or deionized water. The only acceptable values for analytes in the MB are half the RL or an expected, previously determined, background value.

Matrix Spike (MS)

The purpose of an MS is to quantify accuracy and to assure that the analytical technique does not impart a false negative or positive result during the preparation or analysis of the sample. It involves the introduction of the analyte (or an analyte surrogate) of interest into the actual sample matrix and then quantitating it.

The amount detected divided by the amount added to the matrix is expressed as a percent recovery (%R). Acceptable values of %R range from 75 to 125 percent. Percent recovery is calculated as follows:

%R = [(Spike Amount Detected- Sample Value) I Amount Spiked] x 100

Matrix Spike Duplicate (MSD)

The purpose of an MSD is to quantify laboratory precision. An acceptable RPD is less than or equal to 25 percent. The MSD involves duplication of the MS resulting in two data points from which relative percent difference (RPD) is calculated as follows:

RPD = [(MS - MSD) I (Average of MS and MSD)] X 100

9.5.8 Data Validation

Data validation will use data generated from the analytical laboratory and the field. The criteria for evaluating data are summarized in Table 4. References that can be used to assist in data validation include *EPA Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Data Review* (EPA 2010) and *EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Data Review* (EPA 2008).

The purpose of data validation is to ensure that data collected are of sufficient quality for inclusion in reports to the State Water Board. In order to serve, this purpose, the following information must be available in order to evaluate data validity:

1. Date of sample collection, required to identify sample holding time.
2. Location of samples, required to identify sample.
3. Laboratory QA/QC procedures, required to assess analytical accuracy, precision, and sample integrity. A laboratory QA/QC sample set consists of a MS, a MSD, and a MB. A laboratory QA/QC sample set will be analyzed by the laboratory for each field sample batch. Sufficient sample volume and number will be supplied to the laboratory in order to prepare and evaluate the laboratory QA/QC sample set.
4. Analytical methods, required to assess appropriateness and acceptability of analytical method used.
5. Detection limits, required to assess lower limit of parameter identification.
6. Holding times, preservation, and dates of extraction and analysis, required to assess if a sample was extracted and analyzed within the specified time limits and if a sample was stored at the appropriate temperature.
7. Field QA/QC procedures, required to assess field precision and sample integrity. A field QA/QC sample set consists of FB and FD samples. A field QA/QC sample set will be analyzed by the laboratory for one sampling event per year. Sufficient sample volume and number will be collected in the field and supplied to each laboratory in order to prepare and evaluate the field QA/QC samp1e set.

9.5.9 Data Qualification

Data collected for compliance with the Permit will be qualified through the analytical laboratory data validation process described in Section 9.6.8. This process will ensure all data has been thoroughly reviewed and qualified as valid. During the data validation process, data qualifiers will be used to classify sample data. The following qualifiers will be used:

- A:Acceptable. The data have satisfied each of the sampling and analysis requirements and are quantitatively acceptable (i.e., valid) and will be used for compliance purposes.
- R: Reject. Data not valid. This qualifier will be used for samples that cannot be uniquely identified by date of collection or sample location or that fail holding time, detection limit requirements, or criteria established in Table 4. Invalid data will not be presented in reports submitted to the Water Board.

9.5.10 Corrective Action

Field or Laboratory QA/QC Exceedance

If previously described criteria for valid data are not met, then corrective action as follows will be taken:

1. The laboratory will be asked to check their QA/QC data and calculations associated with the sample in question. If the error is not found and resolved, then:

a. The extracts or the actual samples, which will be saved until the data are validated, will be reanalyzed by the laboratory if they are within holding time limitations. These new results will be compared with the previous results. If the error is not found and resolved, then:

b. If field analytical equipment is used, then calibration records will be reviewed. If the error is not found, then:

c. The sampling procedure and sample preparation will be re-checked and verified. If the procedures appear to be in order and the error is not resolved, then:

d. The data will be deemed invalid and not used.

2. Upon discovery of the source of an error, all reasonable attempts will be made to address the cause of the error and remedy the problem.

9.5.11 Data Reporting

The results of sampling and analysis will be summarized and submitted to the Water Board in the Annual Report. The data will be tabulated so that they are readily discernible.

10.0 PROCEDURES TO PREVENT SAMPLE CONTAMINATION

Measures will be taken to prevent sample collection contamination from persons, equipment and vehicles associated with algaecide and aquatic herbicides application, as follows:

- Background monitoring sample collection will be carried out prior to application equipment or algaecides/aquatic herbicides being handled.
- Background monitoring sampling, as well as post event monitoring sampling (within one week), if appropriate, may be carried out from shore within the sampling areas to eliminate the potential for contamination.
- Sampling equipment, with particular emphasis on ice chest and sample bottles, will be transported separately from algaecides or aquatic herbicides and application equipment on the day of the application event.
- Background monitoring will take place prior to the application event.
- For event monitoring, sampling will be carried out after application equipment and all application related equipment and devices including personal protection equipment used during the application has been removed from the sampling location or boat (if used), if no other boats are available to support sampling efforts.
- If possible, sample collection will be done no closer than 50 feet from application equipment and preferably upwind. If there are multiple personnel supporting applications, one will be designated the sample collector while the other will be responsible for boat operation.
- During sample bottle handling and sample collection, disposable rubber gloves will be used when collecting a water sample. Gloves will be changed between sampling locations.
- The pre-labeled sample bottle will be completed with time and date of sample collection immediately after removing from the sample ice chest and replaced in the ice chest immediately after sample collection.
- In the event that sampling equipment will be used in more than one location, the equipment will be thoroughly cleaned with a non-phosphate cleaner, triple-rinsed uncontaminated water, and then rinsed once with the water being sampled prior to its first use at a new sample collection location, as described in Section 9.3.4.
- Once sampling has been completed, water samples will be delivered immediately to the laboratory, if possible.
- If background and event samples cannot be delivered on the same day, sample bottles will be stored in a clean refrigerator or ice chest with adequate ice until samples can be delivered the next business day.

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11.1 DESCRIPTION OF BMPS

Travis AFB regularly implements the following BMPs to eliminate or reduce the discharge of pollutants and minimize the areal extent and duration of impacts to water quality. During implementation, the effectiveness of the BMPs are continually evaluated and refined as needed to enhance protection of surface water. The following BMPs will be to ensure the safe, efficient and efficacious use of algaecides and aquatic herbicides.

11.2 Spill Prevention and Containment

Applicators take care when mixing and loading algaecides and aquatic herbicides and adjuvants. All label language is followed to ensure safe handling and loading of algaecides and aquatic herbicides. Application equipment is regularly checked and maintained to identify and minimize the likelihood of leaks developing or failure that would lead to a spill. If possible, algaecides and aquatic herbicides will be mixed and loaded before leaving for the application site(s).

If algaecides or aquatic herbicides are spilled, they will be prevented from entering any waterbodies to the extent practicable. Travis AFB vehicles contain and staff are trained in the use of absorbent materials such as kitty litter, “pigs” and “pillows.” Spills will be cleaned up according to label instructions, and all equipment used to remove spills will be properly contained and disposed of or decontaminated, as appropriate. Applicators will report spills as required by base policy and in a manner consistent with local, state and federal requirements.

11.3 Appropriate Application Rate Measures

The following BMPs help ensure the appropriate algaecide and aquatic herbicide application rate is used.

11.3.1 Site Scouting

Prior to treatment, Travis AFB’s PCA and/or qualified staff scout sites to evaluate the extent to which acceptable aquatic weed thresholds have been exceeded. Thresholds are based on maintenance of recreational and aesthetic beneficial uses, and the prevention of siltation and odors.

If a location is deemed to have exceeded a threshold, or given weed population is anticipated to exceed a threshold based on site and weather conditions, historical weed growth, or other information, an aquatic herbicide application is considered. If the application can be made without negatively impacting the water quality, then an application is made.

11.3.2 Written Recommendations Prepared by PCA

Prior to application, a Pest Manager licensed by DPR scouts the area to be treated, makes a positive identification of pest(s) present, checks applicable product label(s) for control efficacy, and receives work order to do the pesticide treatment from the Facility Manager, determines rates of application and any warnings or conditions that limit the application so that non-target flora and fauna are not adversely impacted. For example, wind speed and air temperature may have significant impacts on the transport of aquatic herbicides. The PCA may place restrictions or prohibitions on aquatic herbicide applications based on site conditions to prevent impact to non-target sensitive species that may be downwind or downstream of the application area. Other factors considered by the PCA include day length, existing or anticipated precipitation, current

and anticipated water exchange and water depth and movement. Licensed applicators with the category "Aquatic" must complete continuing education to stay licensed and therefore are up-to-date on the latest techniques for pest control. For applications to vernal pools, a certified pesticide applicator will conduct the site visits and communicate with a PCA for written recommendations.

11.3.3 Applications Made According to Label

Aquatic herbicide applications are made according to the product label in accordance with regulations of the EPA, DPR, and the local Agricultural Commissioner.

Travis AFB regularly monitors updates and amendments to the label so that applications are always in accordance with label directions.

11.3.4 Applications Made by Qualified Applicator Certificate Holders

Qualified Applicator Certificate holders licensed by DPR make applications or supervise applications recommended by the PCA. Licensed applicators have knowledge of proper equipment loading, nozzle selection, calibration and operation so that spills ate minimized, precise application rates are made according to the label and only target plants are treated. Licensed Qualified Applicator Certificate holders must complete continuing education to stay licensed, and therefore are up-to-date on the latest techniques for pest control.

11.3 Staff Education

See Section 11.2.2 for base staff continuing education requirement for selection and application of algaecides and aquatic herbicides.

11.4 Water Users Coordination

As required by the algaecide and aquatic herbicide label, water users potentially affected by any water use restrictions will be notified prior to an application being made. There are currently no public agencies or downstream water users that need notification prior to algaecide treatments. If that changes, every calendar year at least 15 days prior to the first application of algaecide or aquatic herbicide, Travis AFB will notify the potentially affected water users.

11.5 Fish Kill Prevention

11.5.1 Applications Made According to Label

All aquatic herbicide applications are made according to the product label in accordance with regulations of the U.S. EPA, CalEPA, DPR, Cal OSHA and the local Agricultural Commissioner. Precautions on the product label to prevent fish kills will be followed. For example, limitations on the surface water area treated will be followed to prevent dead algae or aquatic weeds from accumulating and then decaying and subsequently depressing the dissolved oxygen level. Depressed dissolved oxygen may adversely impact fish populations.

11.5.2 Written Recommendations Prepared by PCA

Prior to application, a Pest Manager licensed by DPR scouts the area to be treated, makes a positive identification of pest(s) present, checks applicable product label(s) for control efficacy, and prepares a written recommendation, including rates of application, and any warnings or conditions that limit the application so that fish are not adversely impacted.

11.5.3 Applications Made by Qualified Applicator Certificate Holders

Base Qualified Applicator Certificate holders, QALs, or those under their direct supervision make applications recommended by the PCA. These applicators have knowledge of proper equipment loading, nozzle selection, calibration, and operation so that spills are minimized, precise application rates are made according to the label, and only target algae or vegetation are treated. Calibration ensures that the correct quantity and rate of herbicide is applied.

11.6 Evaluation of BMP Effectiveness

The effectiveness of BMPs will be continuously evaluated during the year, as well as in-depth evaluation at the end of the year. The following data will be used to evaluate BMP effectiveness:

- Results of sampling and analysis as described here
- Feedback from field staff, including pest control efficacy, staff safety and efficiency

After data from surface water quality monitoring has been reviewed, if results indicate that an aquatic herbicide was present at a time and location that are not protective of water quality, BMPs used in that area will be reevaluated and modified as needed to address potential cause(s) for the presence of the aquatic herbicide detection.

Note that the presence of an aquatic herbicide does not in and of itself suggest that a beneficial use has been impaired or that water quality has been adversely affected. Criteria used to evaluate protectiveness include, but are not limited to review of published beneficial uses, actual beneficial uses based on site-specific conditions, numeric criteria, if any, described in the appropriate Regional Water Quality Board Basin Plan, the General Permit, or as described in *A Compilation of Water Quality Goals* (Central Valley Regional Water Quality Board 2011).

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12.1 EXAMINATION OF POSSIBLE ALTERNATIVES

12.2 Alternative Management Options Evaluation

As appropriate BMPs are identified and demonstrated by reliable sources, Travis AFB will evaluate them and consider them for implementation. Reliable sources include, for example, the University of California Cooperative Extension.

If aquatic weed thresholds can be maintained at acceptable levels with efficient use of alternative control techniques, then these techniques will be considered and implemented as feasible. Travis AFB has assessed the effectiveness of the following techniques as alternatives or supplements to the control of aquatic pests.

12.2.1 No Action

As feasible, this technique is used. For example, consistent with the IPMP program used by Travis AFB, a threshold is typically reached prior to treatment. Prior to reaching a threshold, no control is considered.

12.2.2 Prevention

Habitat Modification

A potential method for the control of submersed aquatic vegetation is to line Travis AFB's drainage channels. Channels can be lined with plastic or rubber liners, or be permanently lined with concrete. Liners generally keep submersed weeds under control for a short period of time by limiting the amount of growing substrate (dirt). However, sediment will eventually build up in lined channels and must be manually removed to keep the channel weed-free. This technique is typically very costly and still requires ongoing maintenance that can fragment weeds, increase sediment loads downstream, and can have adverse impacts on water quality.

Native Species Establishment

No appropriate native plants have been found to establish within waterways to out compete the problematic native and non-native weed species of interest identified in Section 4.0 (page 4-1) and not create similar or other operational or aesthetic problems. As such, aquatic vegetation must be removed or controlled to maintain the weed density tolerances established by Travis AFB.

After the removal of non-native invasive species along drainage channel banks, the introduction and re-establishment of native species can be successful. This technique provides competition for non-desirable species and reduces the need for weed abatement. Limitations to this approach include availability of suitable native species, availability of labor to plant native species, and safe access to banks for work crews. Plant characteristics such as growth patterns and the potential to invade crops must be considered as well as the timing for introduction of native plants (e.g., wet season/running water). This technique can be expensive, may take many years, and may be subject to regulatory agency (i.e., California Department of Fish and Wildlife, U.S. Army Corps of Engineers, etc.) approval. Finally, many of the species identified for removal are in fact native species that occur and proliferate in ways characteristic of a natural wetland and stream system, thus a native species establishment alternative method does not exist.

12.2.3 Mechanical or Physical Methods

Mechanical Removal

Mechanical removal includes bucket dredging (with appropriate permit authorizations) hand or motor-driven cutting along banks where possible. The grade of the banks of stormwater drainage channels throughout Travis AFB is too steep to permit mowing, grazing or hand cutting of weeds.

Specific upland dredge spoil locations have not received an environmental assessment and may negatively impact other species that may be listed, threatened, or endangered.

In the pond, mechanical removal of rooted/un-rooted plants and algae could employ the use of a non-mechanically powered row boat. Personnel may use rakes or netting to remove species of concern. Hand removal of tules/cattails/bulrushes may be employed with or without the use of a row boat.

In general, mechanical control techniques are expensive, very labor intensive per unit length of waterway treated, not as effective, worsen downstream weed problems by moving plant fragments throughout Travis AFB, and may cause temporary water quality degradation. The equipment and labor required to perform these techniques are not available on Base, without hiring an outside contractor. This may cause delays in removal that lead to increased plant material to remove and increased cost.

Mechanical removal also places staff at risk of slip, trip and fall hazards as well as insect and snake bites, risks the spilling of motor oil and fuel from two-cycle motorized brush cutters, and equipment operation can increase air pollution. Travis AFB estimates that the cost per mile of mechanically treated water way is significantly higher than the cost of labor, product and equipment of the application of aquatic herbicide. The increased cost of mechanical aquatic weed abatement does not include the cost of the aforementioned risks (stormwater pollution abatement, workman's compensation claims. etc.).

In some instances, however, the use of mechanical techniques may be necessary due to the presence of aquatic resources sensitive to the use of aquatic herbicides. Travis AFB estimates that mechanical removal is 10 to 25 times more expensive than using chemical controls. This additional expense does not include the cost for disposal such as dredge disposal or for obtaining required permits.

Environmental impacts due to the use of mechanical techniques include the creation of water-borne sediment and turbidity due to people and equipment working in the water. This suspended sediment can adversely affect aquatic species by lowering dissolved oxygen and preventing light penetration, by clogging gills and/or being buried.

Mechanical methods would require an environmental assessment to determine if any sensitive species are negatively impacted in any by using the proposed method.

Downstream deposition of sediment may cause additional problems including creating new areas for weed establishment, division and re-establishment of aquatic weeds, and adverse impacts to stream hydrology resulting in bank erosion. In addition, gaining access to water to accomplish mechanical removal requires that potentially beneficial habitat maybe disturbed in route to the target pests. This disturbance may interrupt native species nesting and breeding. The costs for

trucking and waste disposal are not included. Waste must be taken to traditional landfills and cannot be taken to green waste disposal due to:

- The concern that redistribution of the material may occur and subsequently result in re-establishment.
- The concern that tules contain silica, which is resistant to successful green waste bio-decomposition.

Perennial pepperweed seedlings are easily controlled by hand-pulling or tillage but these techniques do not control established plants because shoots quickly resprout from vast root reserves. In addition, seedlings are not often encountered. Root segments as small as 1 inch are capable of producing new shoots. Finally, mowing stimulates pepperweed to resprout and produce new growth though if combined with herbicide treatment has been shown to be effective (DiTomaso et al. 2013).

Arundo thrives when cut and controlled mechanically, sprouting again with vigor. The species is often controlled with a combination of herbicide and hand removal, which reduces the surface area that herbicide needs to be applied to, reducing the overall amount of herbicide needed.

While manual or mechanical control of stinkwort is effective, stinkwort occurs in several vernal pool complexes at Travis AFB filled with concrete rubble that make mechanical and manual control ineffective and a safety issue. The amount of stinkwort present also limits manual control options because they would be too time-consuming.

Controlled Burns

This option is most suitable for emergent and terrestrial weeds and is not suitable for submerged aquatic weeds. Burning is not effective at reducing perennial pepperweed stands.

Grazing

This option is most suitable for emergent and terrestrial weeds and is not suitable for submerged aquatic weeds. Impacts to water quality from animal feces, increases in turbidity, nutrients, and bank erosion, and impacts to desirable species make this option unfeasible in some though not all cases. Grazing is being considered as a viable and desirable weed control option along downstream / southern reaches of Union Creek. Grazing is a viable prevention measure for controlling the cover/extent of perennial pepperweed and will be implemented in some affected areas and monitored for effectiveness. However, because perennial pepperweed can reproduce vegetatively from roots and root fragments, grazing will never eradicate the species by itself. Stinkwort can be toxic if ingested by livestock. Livestock are not known to consume Arundo.

Tilling or Disking

This option is not suitable for the control of aquatic weeds because it would increase bank erosion and likely impact desirable species and habitat. Cultivation and tillage to control perennial pepperweed typically increases infestation by dispersing root fragments and is generally not possible due to the potential presence of federally listed species in the soil.

12.2.4 Cultural Methods

Cultural methods used to reduce the amount of aquatic herbicides used include modifying the timing of algaecide and aquatic herbicide and non-herbicide controls to prevent plants from reaching reproductive growth stages. Another cultural method is making applications before the density of algae or aquatic vegetation is high enough to require higher algaecide or aquatic herbicide rates or additional applications to maintain algae or aquatic weed populations below

threshold levels.

12.2.5 Biological Control Agents

Goats and sheep are often used for grazing in and along riparian areas. As discussed previously, grazing may be suitable for emergent and terrestrial weeds and is not suitable for submerged aquatic weeds or algae. Impacts to water quality from animal feces, increases in turbidity, nutrients, and bank erosion, and impacts to desirable species make this option unfeasible in some

cases. The cost of hiring grazing animals is also generally more costly than algaecide and aquatic herbicide control alternatives. This option is not a suitable alternative control. Grazing will be considered as an alternative control, as feasible.

12.2.6 Algaecides and Aquatic Herbicides

The selection of and decision to use an algaecide or aquatic herbicide is based on the recommendation of a PCA. The PCA considers a variety of control options that may include mechanical and cultural techniques that alone or in combination with chemical controls are the most efficacious and protective of the environment.

Evaluating alternative control techniques is part of Travis AFB's integrated pest management approach; therefore, an alternative treatment may be selected as part its program. Alternative control techniques and detailed description of each of these is presented in Section 12.1. In general, alternative control techniques are expensive, labor intensive, not as effective, and cause temporary water quality degradation. The equipment and labor required to perform these techniques is not always readily available. This may cause delays in removal leading to increased plant material to remove and increased cost.

The quantity of algaecide and aquatic herbicide required for an application is determined by a PCA that has followed the label directions in making a recommendation. The rate at which an algaecide and aquatic herbicide is used is highly variable and depends on the type, time of year, location, and density and type of aquatic weeds, water presence, and goal of the application. All these factors are considered by the PCA prior to making a recommendation for an application.

12.2 Least Intrusive Alternative Evaluation

Travis AFB uses various methods including mechanized vehicles (trucks, etc.) and personnel with backpack sprayers to make algaecide and aquatic herbicide applications. Combined with the need to hold, safely transport and properly apply algaecides and aquatic herbicides, Travis AFB's techniques are the least intrusive as feasibly possible. Please refer to Table 1 for application methods.

12.3 Decision Matrix Application

As previously stated, a PCA scouts the area to be treated, makes a positive identification of pest(s) present, checks appropriate algaecide and aquatic herbicide product label(s) for control efficacy, and prepares a written recommendation. The written recommendation includes rates of application, and any warnings or conditions that limit the application.

The PCA may also recommend that an adjuvant be used to enhance the efficacy of the algaecide or aquatic herbicide.

13.1 REFERENCES

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FIGURES

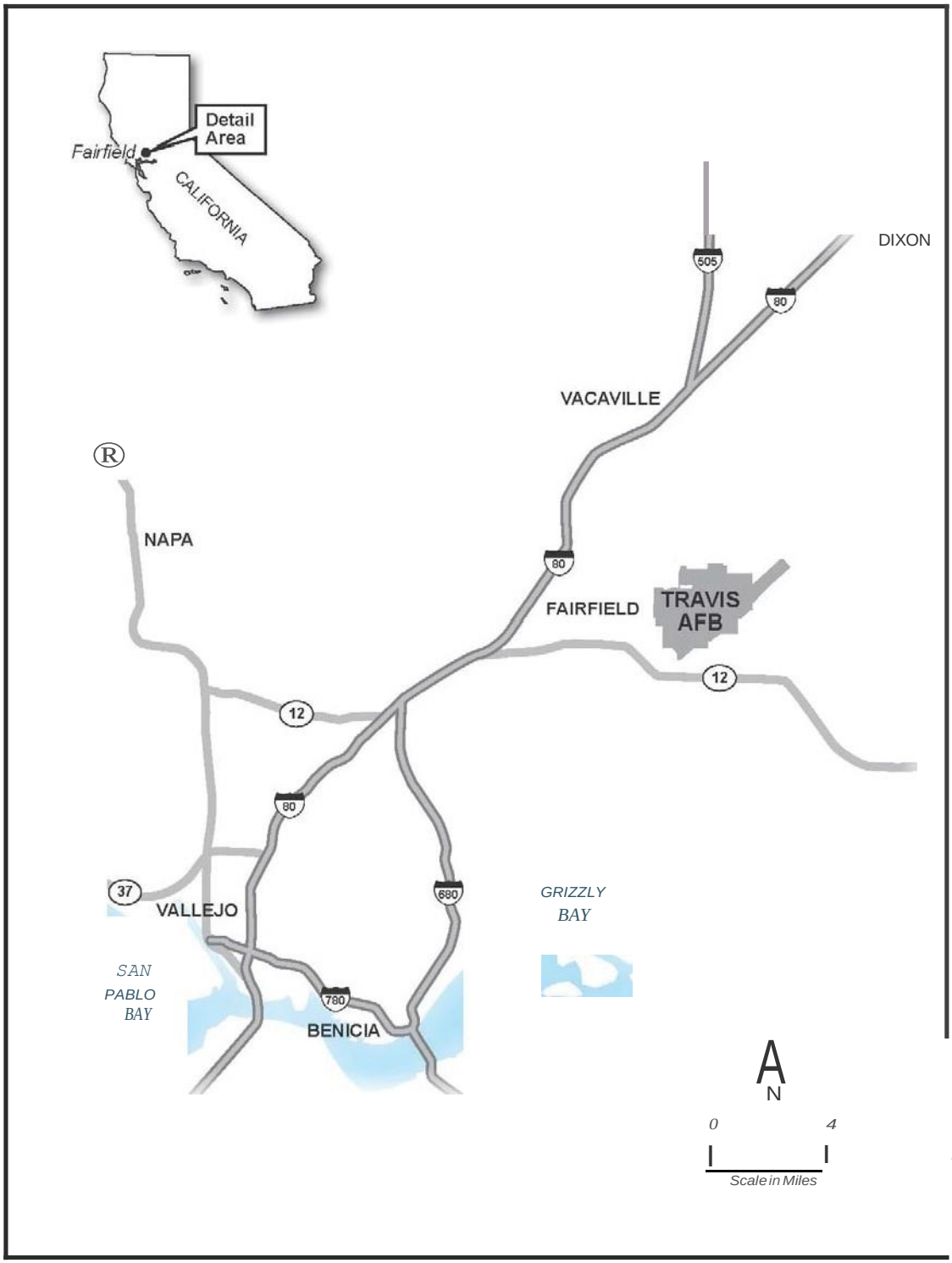
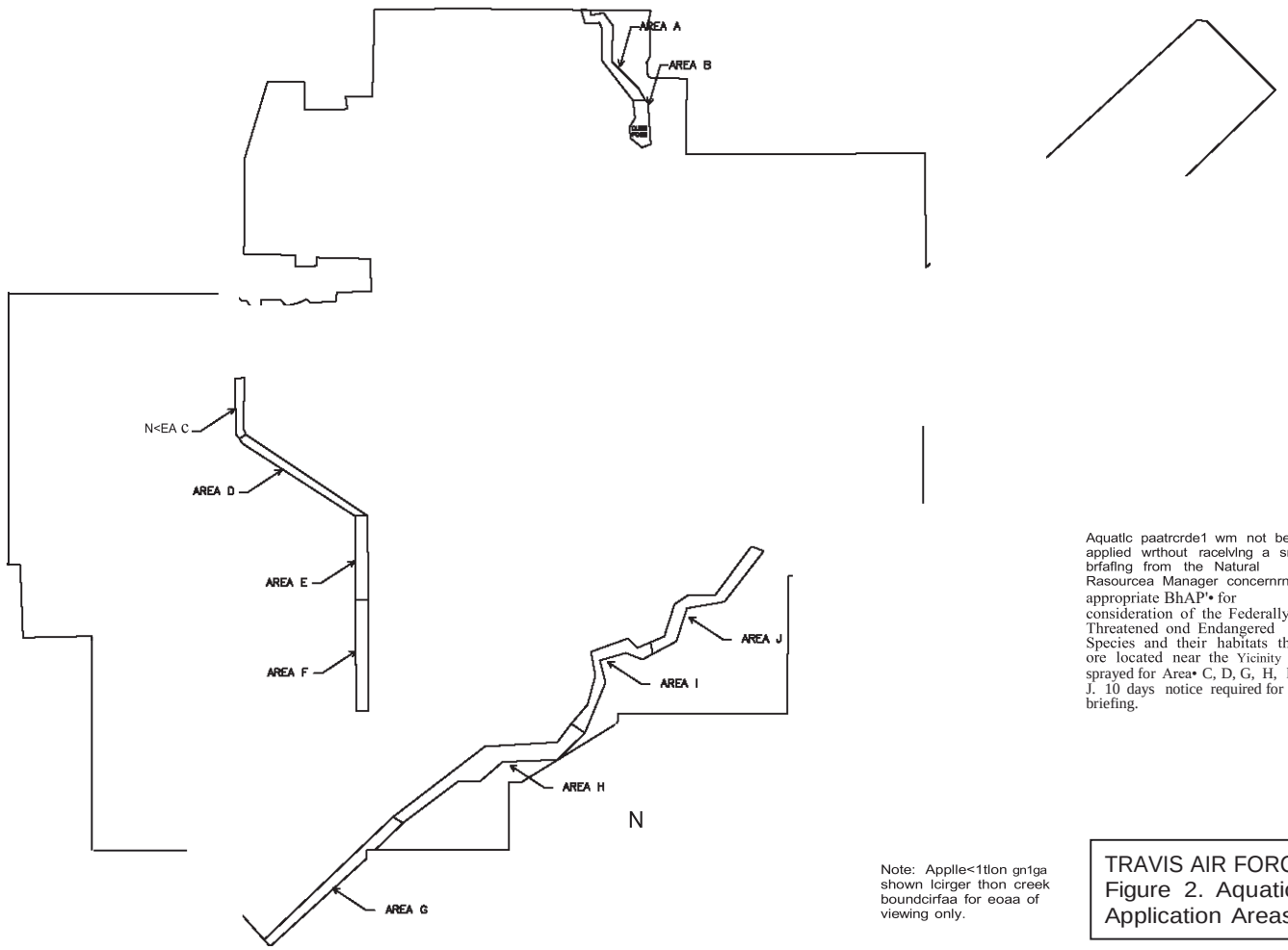


Figure 1. Site Location - Travis AFB, Fairfield, Solano County, California



Aquatlc paatrcrde1 wm not be applied wrthout racelvlng a srte brfaflng from the Natural Rasourcea Manager concernrng appropriate BhAP'• for consideration of the Federally Threatened ond Endangered Species and their habitats that ore located near the Yicinity to be sprayed for Area• C, D, G, H, land J. 10 days notice required for site briefing.

Note: Applle<1tlon gn1ga shown lcirger thon creek boundcirfaa for eoaa of viewing only.

TRAVIS AIR FORCE BASE
Figure 2. Aquatic Pesticide Application Areas

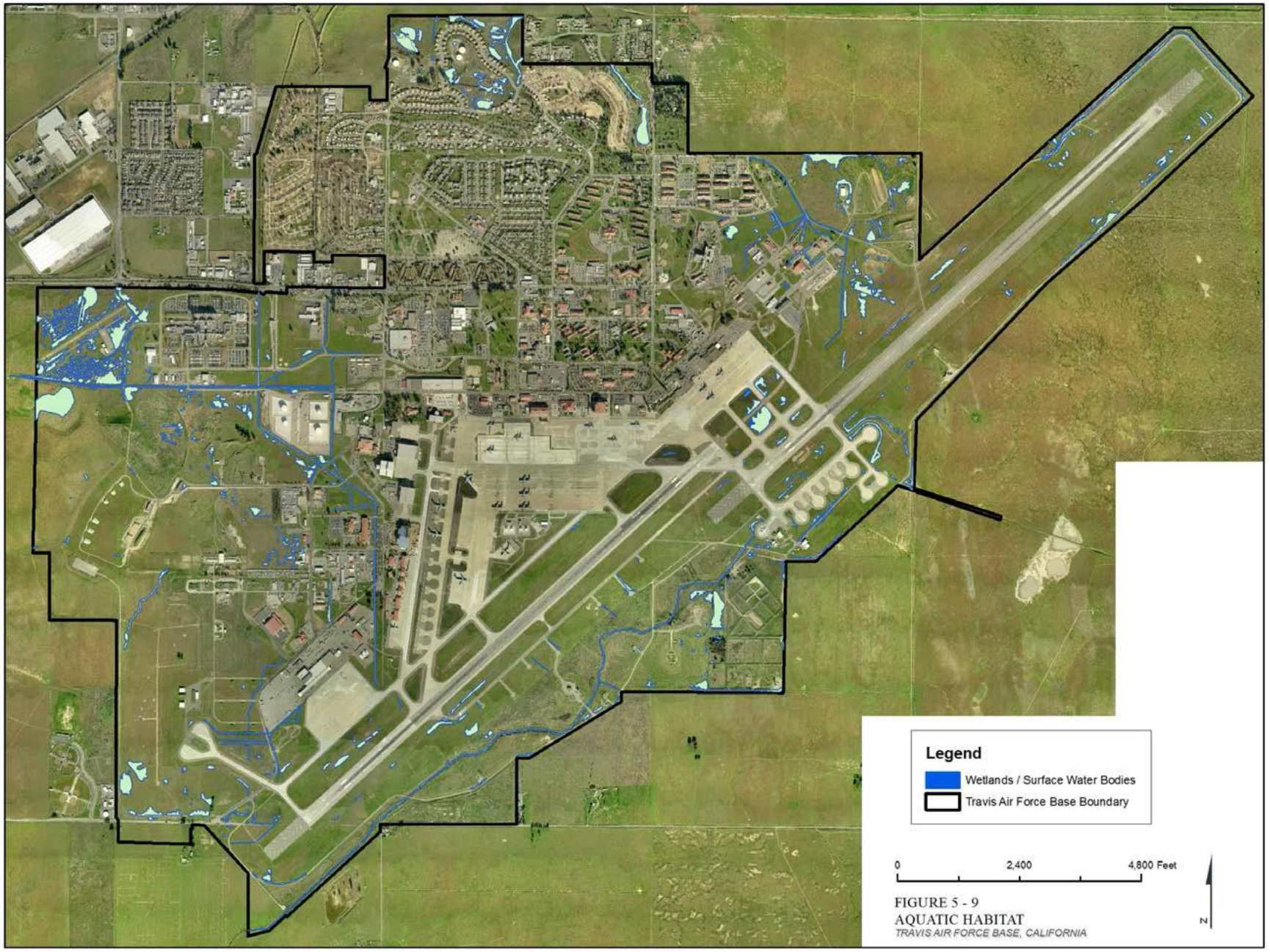


Figure 3: Wetlands / Surface Water Bodies

Form 1

Aquatic Herbicide Application Log rev 12.2013

****IMPORTANT** To Be Completed EVERY TIME an Aquatic Herbicide Application is Made**

I. GENERAL

Date_____ Location_____ Start Time_____ Stop Time_____

Agency_____ Personnel_____

Weather_____

Total Area Treated (Acre or linear feet)_____ Target Weed(s)_____

☐ If NO applications made this month check here and list month:_____

II. PESTICIDE & ADJUVENT INFORMATION

Herbicide #1 Used:_____ Rate or Target Concentration:_____ Total Amount Applied_____

Herbicide #2 Used:_____ Rate or Target Concentration:_____ Total Amount Applied_____

Adjuvant #1 Used:_____ Rate or Target Concentration:_____ Total Amount Applied_____

Adjuvant #2 Used:_____ Rate or Target Concentration:_____ Total Amount Applied_____

Method of Application:_____ Application made **With** water flow / **Against** water flow / **Not Applicable** (Circle One)

III. TREATED WATERBODY INFORMATION

Waterbody type (Circle One: lined canal, unlined canal, creek, drain, ditch, reservoir, lake, pond) Other:_____

Water flow (feet/sec, cfs)_____ Water Depth (feet):_____ Water temperature (^{O}F):_____

Percent weed cover_____ Sheen: (circle one) **yes** **no**

Color: (circle one) **none** **brown** **green** other:_____ Clarity (circle one) **poor** **fair** **good**

Other Information:_____

IV. POST TREATMENT EFFICACY & IMPACT

Describe post treatment efficacy (circle one) **poor** **fair** **good** **unknown**

Describe post treatment efficacy (circle one) **none** **some** **significant** **unknown**

If other than "none" or "unknown", describe:_____

V. GATES, WEIRS, CHECKS OR OTHER CONTROL STRUCTURES (ONLY FILL OUT IF APPLICABLE)

A. Are there any gates or control structures in the treatment area that may discharge to streams, rivers, lakes, or other natural waterways?	**Yes**	**No**	**N/A**
(If the answer to question A is Yes then answer question B-F the table below, otherwise leave blank)			
Before Application			
B. Have flow control structures been closed & sealed to prevent aquatic pesticide from discharging to natural waterways?	**Yes**	**No**	
C. Have necessary flow control structures been inspected for leaks?	**Yes**	**No**	
D. If leaks were found, were they sealed or otherwise prevented from allowing water to discharge to natural waterways prior to application?	**Yes**	**No**	
During Application			
E. Were necessary flow control structures inspected for leaks?	**Yes**	**No**	
F. If leaks developed, was the application stopped until the leak could be sealed or prevented from allowing water to discharge to natural waterways?	**Yes**	**No**	

If the answer of any of the above questions is No, explain:_____

Gate	Time Closed	Time Opened	How was time opened determined:

VI. CERTIFICATION

I_____ (print name) certify that the APAP has been followed (sign here): X_____

Form 2

Aquatic Herbicide Field Monitoring & Sampling Form – Static Water

rev 12.2013

****IMPORTANT** Attach Relevant Aquatic Herbicide Application Log (AHAL) Form**

Agency:_____ **Site Name:**_____

SAMPLE #1: Background (BG)

Collect within the treatment area within 24 hours prior to the start of the application.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale:1"=_____

Sampler Name:_____

Date:_____ Time:_____

Weather Conditions (fog, rain, wind, etc.): _____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Sample Waypoint or GPS Coordinates:_____

DO (mg/L):_____ EC (µs/cm):_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Chemical Sample Collected for (Circle One or More)?

Active Ingredient_____ Nonylphenol Hardness

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Agency:_____ **Site Name:**_____

SAMPLE #2: Event Monitoring (Event)

Collect immediately outside the treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area. The timing for the collection of this sample will be a site-specific estimation based on algae and aquatic weed density and type, size of the application area, and duration of treatment.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale: 1" ~ _____

Collect Field Blank and Duplicate Samples as Needed

Sampler Name:_____

Date:_____ Time:_____

Weather Conditions (fog, rain, wind, etc.): _____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Sample Waypoint or GPS Coordinates:_____

_____

Herbicide Applied (Surfactants?):_____

_____

Target Vegetation:_____

Length of Treated Area (feet):_____

Application Start Date:_____ Start Time:_____

Application End Date:_____ End Time:_____

Application made with or against water flow (Circle One)?

Yes No N/A

DO (mg/L):_____ EC (µs/cm)_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Chemical Sample Collected for (Circle One or More)?

Active Ingredient_____ Nonylphenol Hardness

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Revised 11/19/13

Aquatic Herbicide Field Monitoring & Sampling Form – Static Water

rev 12.2013

Agency:_____ **Site Name:**_____

SAMPLE #3:

Post-Event Monitoring (Post)

Collect within treatment area within 7 days of application.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale: 1" ~_____

Sampler Name:____

_____ Date:

_____ Time:_____

Weather Conditions (fog, rain, wind, etc.):_____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Sample Waypoint or GPS Coordinates:_____

DO (mg/L):_____ EC (µs/cm)_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Chemical Sample Collected for (Circle One or More)?

Active Ingredient_____ Nonylphenol Hardness

Post-Treatment Efficacy (circle one)

poor fair good unknown

Impacts to water quality (circle one)

positive negative unknown

Comments_____

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Date Field Blank (FB) Collected:_____ **Date Field Duplicate (FD) Collected:** _____

Sample	Date and Time Samples, COC and Cooler shipped to lab	Method of Shipment
Background		
Event		
FB & FD		
Post		

Revised 11/19/13

Form 3

Aquatic Herbicide Field Monitoring & Sampling Form – Moving Water

****IMPORTANT** Attach Relevant Aquatic Herbicide Application Log (AHAL) Form**

Agency:_____ **Site Name:**_____

SAMPLE #1: Background (BG)

Collect upstream of, or within the treatment area within 24 hours prior to the start of the application.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale:1"=_____

Sampler Name:_____

Date:_____ Time:_____

Weather Conditions (fog, rain, wind, etc.): _____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Approximate Water Speed (feet/second):_____

Sample Waypoint or GPS Coordinates:_____

Target Vegetation:_____

Site Description:_____

DO (mg/L):_____ EC (µs/cm):_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Chemical Sample Collected for (Circle One or More)?

Active Ingredient_____ Nonylphenol Hardness

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Agency:_____ **Site Name:**_____

SAMPLE #2: Event Monitoring (Event)

Collect immediately downstream of the treatment area immediately after the application event, but after sufficient time has elapsed such that treated water would have exited the treatment area. The timing for the collection of this sample will be a site-specific estimation based on algae and aquatic weed density and type, flow rates, and size of the application area, and duration of treatment.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale: 1" ~ _____

Collect Field Blank and Duplicate Samples as Needed

Sampler Name:_____

Date:_____ Time:_____

Weather Conditions (fog, rain, wind, etc.): _____

_____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Sample Waypoint or GPS Coordinates:_____

Approximate Water Speed (feet/second):_____

Herbicide Applied (Surfactants?):_____

_____

Target Vegetation:_____

Length of Treated Area (feet):_____

_____ Application Start Date:

_____ Start Time:_____

Application End Date:_____ End Time:_____

Application made with or against water flow (Circle One)?

Yes No N/A

DO (mg/L):_____ EC (µs/cm)_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Active Ingredient_____ Nonylphenol Hardness

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Aquatic Herbicide Field Monitoring & Sampling Form – Moving Water

Agency:_____ **Site Name:**_____

SAMPLE #3:

Post-Event Monitoring (Post)

Collect within treatment area within 7 days of application.

Draw Sample Location and Include Identifiable Points of Reference

N

Scale: 1" ~ _____

Sampler Name:_____

Date:_____ Time:_____

Weather Conditions (fog, rain, wind, etc.):_____

Monitoring Area/Site Description (pond, lake, channel open waterway etc.):_____

Sample Waypoint or GPS Coordinates:_____

DO (mg/L):_____ EC (µs/cm)_____

pH:_____ Turbidity (NTU):_____

Temp (°C):_____

Chemical Sample Collected for (Circle One or More)?

Active Ingredient_____ Nonylphenol Hardness

Post-Treatment Efficacy (circle one)

poor fair good unknown

Impacts to water quality (circle one)

positive negative unknown

Comments_____

DO YOU NOTICE	YES	NO	UNKNOWN	IF YES, DESCRIBE YOUR OBSERVATIONS
Floating Materials				
Sheen				
Settleable Substances				
Suspended Material				
Odors				
Water Coloration				
Water Clarity				
Aquatic Community Degradation				

Date Field Blank (FB) Collected:_____ **Date Field Duplicate (FD) Collected:** _____

Sample	Date and Time Samples, COC and Cooler shipped to lab	Method of Shipment
Background		
Event		
FB & FD		
Post		