

**2004 *Spartina* Eradication Program
Water Quality Monitoring**



January 20, 2005

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INTRODUCTION.....	3
TREATMENTS.....	4
SITES	4
SAMPLE HANDLING.....	5
EFFICACY	5
SUMMARY OF IMAZAPYR PRESENCE	5
SUMMARY OF GLYPHOSATE PRESENCE.....	6
SAMPLE LOCATIONS.....	7
<i>Puget Sound</i>	7
<i>Willapa Bay</i>	8
NOXIOUS NPDES PERMIT HERBICIDE MONITORING FORMS	9
SIGNATORY PAGE.....	10

Introduction

Water quality monitoring was conducted in Willapa Bay, and Puget Sound, to detect the presence of glyphosate (Aquamaster™, Rodeo™, or Aquaneat™) and imazapyr (Habitat™) adjacent to locations where *Spartina* control activities were conducted. The monitoring activities, conducted by Washington State Department of Agriculture (WSDA), met the second year monitoring requirement of the Aquatic Noxious Weed Control National Pollution Discharge Elimination System Waste Discharge General Permit, WAG 993-000 (NPDES) *Spartina* section.

The purpose of monitoring was to record glyphosate and imazapyr concentrations in the effected water bodies subsequent to the treatments by different herbicide application modalities utilized for control of certain infestation types. The application/infestation matrices are shown in Table 1. Samples were collected to look at concentrations at the treatment site directly after applications, throughout time over several days after the applications, and off-site directly after the application.

Table 1. Applications used for differing infestation types

Sample Location	Application Type	Herbicide	Infestation Type	Sample Type
Leque Island, Snohomish County	Ground Broadcast	Glyphosate /Imazapyr	Meadow	Concentration/ Concentration though time/ Off-site transport
Doe-Kag – Wats, Kitsap County	Hand Held	Imazapyr	Scattered Regrowth	Concentration/ Concentration through time/Off-site transport
Rose Ranch, Willapa Bay	High Volume	Glyphosate	Clone Field	Concentration
Seal Slough, Willapa Bay	Precision Broadcast	Imazapyr	Meadow	Concentration
Whalen Point/ Jefferson County	Backpack	No-Treatment Conducted	Seedlings	Pre-treatment samples only
Palix Meadow. Willapa Bay	Aerial	Imazapyr	Meadow	Concentration/Concentration through time

Pre-treatment samples were also collected at various sites in each water body at least 12 hours before any treatments were conducted to the sampled water body. Pre-treatment sampling was conducted to identify if any water bodies had pre-existing levels of glyphosate or imazapyr in the water column. All of these samples were returned negative for the presence of glyphosate and imazapyr.

Pre-treatment sampling was conducted at sites that were likely to be used as post treatment sampling sites. The Palix Meadow site and Doe-Kag-Wats site did not receive pre-treatment sampling because those sites were not scheduled for treatment until after applications to those water bodies had already taken place. However, pre-treatment samples were collected at nearby locations in each water body prior to any applications.

Treatments

Spartina treatments occurred between June 1 and October 30, 2004. All treatments were conducted by applicators licensed by WSDA using any of the application types listed in Table 1. Private landowners, United States Fish and Wildlife Service, WA State Department of Fish and Wildlife, WA Department of Natural Resources, WSDA, and county personnel, from Island, Skagit, and Snohomish Counties, conducted applications. All applications were made following the appropriate federal and state approved product labels.

A total of over 6,000 acres were treated with glyphosate and imazapyr employing an integrated approach. The different control programs made mixed use of integrated vegetation management (IVM) strategies; including chemical, mechanical, manual, and biological control approaches.

Sites

All concentration and concentration through time post treatment sampling sites were located at the shoreward edge of the treatment area, and samples were collected at the tide was flowing in over the treatment area. All off-site transport post treatment sampling sites were located at areas where the outgoing tide would move the material towards. Samples were taken during the first outgoing tide, after the treatment site had been inundated.

At Leque Island, the concentration through time sampling was done approximately 48 hours after the final treatment to the site was completed. At the Palix Meadow the concentration through time sampling was done approximately 24 hours after the final treatment to the site was completed. At the Doe-Kag-Wats site the concentration through time sampling was done at 24 hours post treatment.

The Leque Island off-site transport collection site was chosen by conducting a dye release during an outgoing high tide. This dye moved through the area and helped to identify where the best post treatment-sampling site would be located. The Doe-Kag-Wats off-site transport collection site was located at the mouth of the only channel that empties from the wetland into the Puget Sound. Any herbicide being transported out through the tide would have to flow past this collection site.

Sample Handling

All samples were collected no sooner than the subsequent high tide after the completion of treating the entire site. Water depth at sampling stations ranged from 6 inches to approximately 5 feet. Samples were sent to the lab on ice, via overnight courier. The samples were occasionally stored overnight in a cooler inside a refrigerator before being shipped the next morning. This delay was incurred because of the variable timing of sampling did not allow for immediate shipping. A Washington State Department of Ecology accredited laboratory using the method, EPA 547 for glyphosate analysis and an HPLC analysis method for imazapyr, analyzed all samples.

Efficacy

Some efficacy surveys were conducted during the treatment season. These mainly focused on the amount of “brown down” and new shoot development exhibited in the areas receiving trial treatments. The nature of the reaction of *Spartina* to glyphosate and imazapyr treatments makes complete, same season surveys nearly futile. The plants turn brown to the ground, but the bulk of the roots may be unaffected. This sizeable amount of root mass beneath the surface will, a majority of the time, send up shoots the next growing season that were imperceptible the prior season.

Summary of imazapyr Presence

Sampling for imazapyr was done to look for presence of the herbicide directly after application at the treatment site (concentration), directly after application away from the treatment site (off-site transport) and at the treatment site 24 and 48 hours after application (concentration through time). All the samples that were analyzed and found presence of herbicide were at extremely low levels with the highest level being 8.8 parts per billion (ppb). Samples collected for off-site transport, and concentration through time (48 hours) were found to have no detectable levels of the herbicide present. The concentration through time sample collected at 24 hours post treatment did have herbicide present, had decreased from the sample collected directly after the application.

Treatment Site: Seal Slough (approximately 900 acres treated)

Sample 1 - concentration	Sample 2 - concentration
8.8 ppb	7.1 ppb

Treatment Site: Leque Island. (Approximately 87 acres treated)

Sample 1 - concentration	Sample 2 – off-site transport
7.2 ppb	ND
Sample 3 – concentration through time	Sample 4 – concentration through time
ND	ND (replicate sample)

Treatment Site: Palix Meadow (approximately 600 acres treated)

Sample 1 - concentration	Sample 2 - concentration
8 ppb	7 ppb

Treatment Site: Doe-Kag-Wats. (Approximately 0.5 acres treated)

Sample 1 - concentration	Sample 2 – off-site transport
ND	ND
Sample 3 – off-site /through time	Sample 4 – concentration through time
ND	ND
Sample 5– equipment blank	
ND	

Summary of Glyphosate Presence

Sampling for glyphosate was done to look for presence of the herbicide directly after application at the treatment site (concentration), directly after application away from the treatment site (off-site transport) and at the treatment site 24 and 48 hours after application (concentration through time). All samples collected were well below the 700 ppb drinking water standard except for the Rose Ranch site, where one sample was reported at 760 ppb and the second sample was reported at 2480 ppb. Interestingly enough, the sample that reported 760 ppb was collected only feet inside the treatment site and the water depth was only 6 inches. Were as the sample that reported 2480 ppb was collected approximately 50 feet outside the treatment site. The water was collected at the base of a farm dike, adjacent to the tide gate. The water depth was over 5 feet deep. One would assume that the sample collected from the deeper water would be less concentrated and yield lower results, were as the sample collected inside the treatment site, in very shallow water would yield higher results.

This site as provided anomalous results two years in a row. This site will be further sampled during the 2005 season, and pre-treatment samples will be collected at the exact location of the 2004 post treatment samples, as well as at the main channel.

Treatment Site: Rose Ranch (approximately 0.5 acres treated)

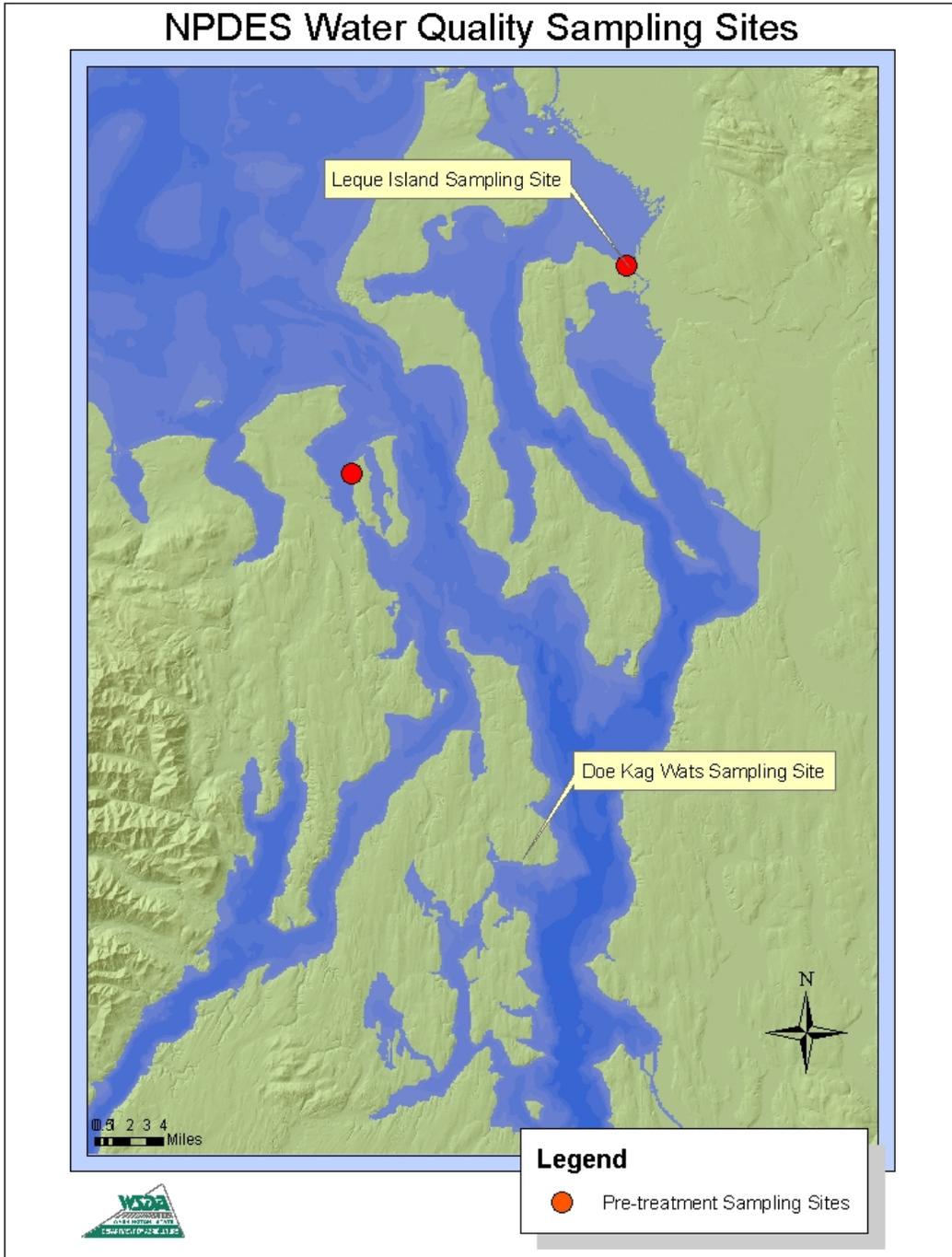
Sample 1 - concentration	Sample 2 - concentration
760 ppb	2480 ppb

Treatment Site: Leque Island (approximately 87 acres treated)

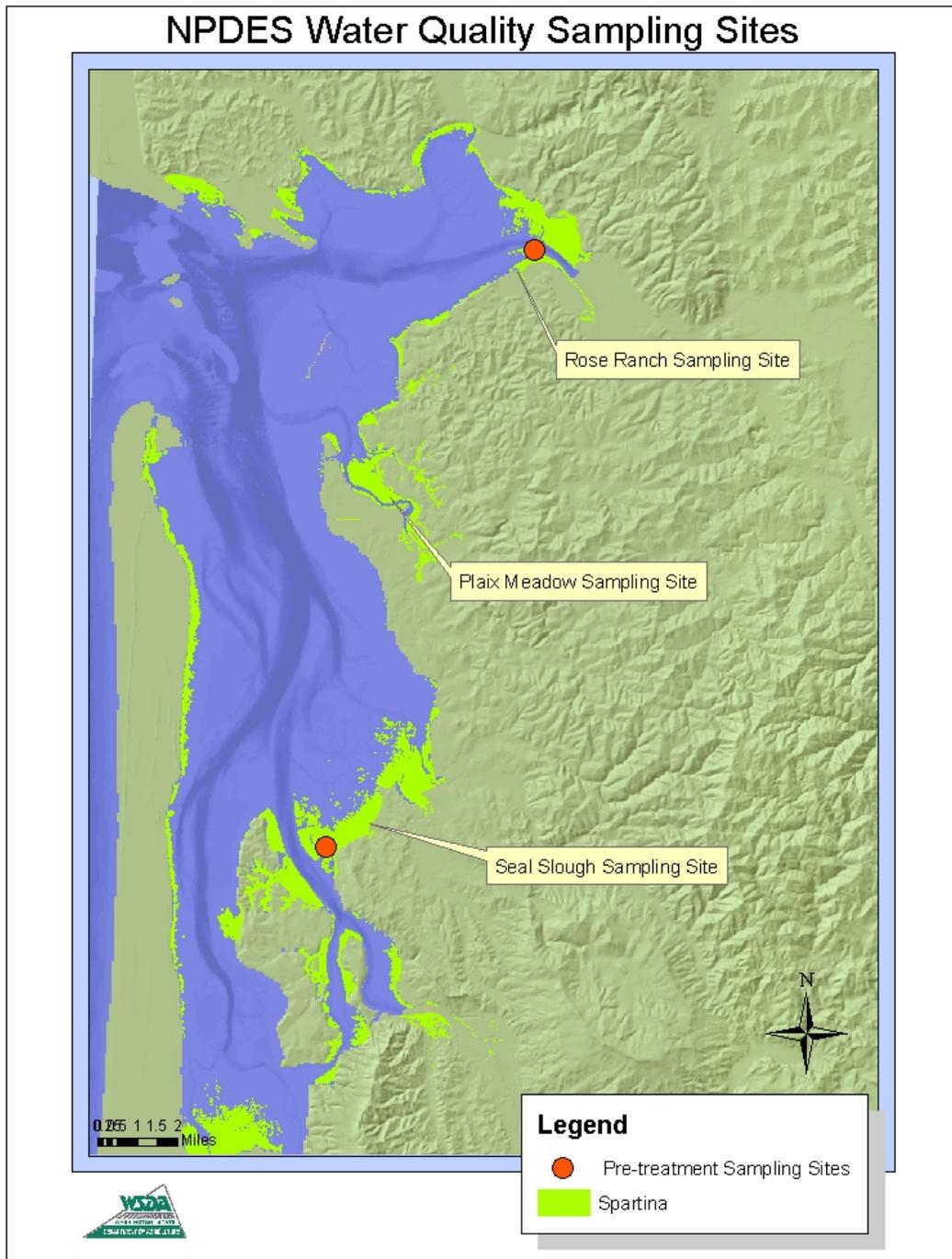
Sample 1 - concentration	Sample 2 – off-site transport
90 ppb	No Detection (ND)
Sample 3 – concentration through time	Sample 4 – concentration through time
ND	ND

Sample Locations

Puget Sound



Willapa Bay



Attachment A.
Noxious NPDES Permit Herbicide Monitoring Forms
Included Separately

Attachment B Signatory Page

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 gathered and evaluated the information submitted. Based on my inquiries of the person or persons who manage the system, or those persons directly responsible for gathering information, in 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 fines and imprisonment for knowing violations.
