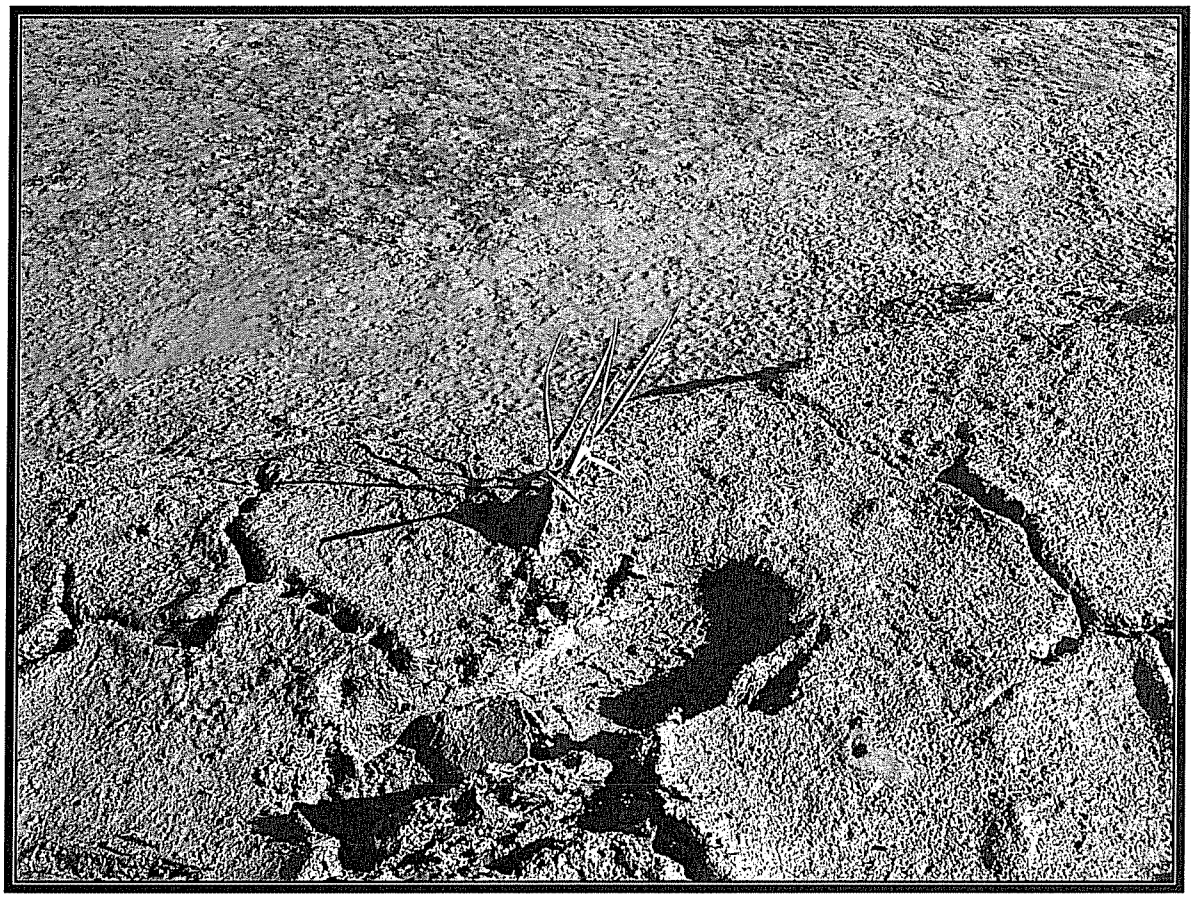
2007 *Spartina* Eradication Program
Water Quality Monitoring



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EXECUTIVE SUMMARY:

Spartina is an aggressive aquatic weed that negatively impacts Washington's waters. The Washington State Department of Agriculture leads the effort to eradicate *Spartina* using integrated pest management (IPM) methods. The use of herbicides for aquatic plant management requires maintenance of a National Pollution Discharge Elimination System permit (NPDES). To detect any pollution from herbicide use and to meet the requirements of the NPDES permit, WSDA monitored water quality at *Spartina* control sites in 2007. Triangle Cove in the Puget Sound and Tarlatt Slough and Rose Ranch in Willapa Bay were monitored for glyphosate and imazapyr. No herbicide was detected in these waters before and after herbicide applications.

BACKGROUND:

Spartina is an extremely damaging biological invader with the potential to harm the ecosystems and economies of our state's estuarine waters. The Washington State Department of Agriculture (WSDA) is the lead agency charged with eradicating this aquatic nuisance species from Washington State's shores. WSDA partners with a wide range of federal, state, and local agencies, tribal governments, and non-profit organizations to conduct this work. WSDA and its cooperators adhere to an IPM approach to controlling Spartina; using mechanical, biological, and, when appropriate, chemical techniques.

The use of herbicides in and around the aquatic environment requires the maintenance of a National Pollution Discharge Elimination System (NPDES) permit. The NPDES (#WAG-99300) permit for *Spartina* is maintained by WSDA as the lead agency for *Spartina* control activities in Washington.

The compliance schedule for NPDES permit requires WSDA to monitor water quality in waters affected by *Spartina* control activities for five years. The Spartina program uses restricted use herbicides containing the active ingredients glyphosate and imazaypyr labeled for aquatic use. In 2007, WSDA monitored for the presence of these herbicides in effected water bodies adjacent to locations where Spartina control activities occurred. These protocols are designed to fulfill the Aquatic Noxious Weed Control National Pollutant Discharge Elimination System Permit (#WAG-99300).

OBJECTIVES:

There were two major objectives of the 2007 water quality monitoring:

- Monitor imazapyr and glyphosate concentrations within Triangle Cove in the Puget Sound and determine if any offsite transport of imazapyr and glyphosate occurred during 2007.

- Monitor imazapyr and glyphosate concentrations at Tarlatt Slough and Rose Ranch in Willapa Bay following *Spartina* treatments.

To evaluate these objectives sampling occurred at four sites; Triangle Cove-Puget Sound, Mouth of Triangle Cove-Puget Sound, Tarlatt Slough-Willapa Bay, and Rose Ranch-Willapa Bay. Table 1 details the monitoring and treatments for each these sites.

As a control, all sites were sampled before any herbicide applications in 2007. At least 12 hours prior to treatment, each site was sampled for pre-existing concentrations of imazapyr and glyphosate. All pretreatment samples returned negative for the presence of imazapyr and glyphosate. The herbicide concentrations of the samples were below the practical quantitative limit for the laboratory that analyzed the samples.

Table 1: Summary of 2007 water quality monitoring sampling and treatment regimes in Puget Sound and Willapa Bay.

Sample Location	Application Type	Herbicide	Infestation Type	Sample Type
Triangle Cove	Precision Broadcast	Imazapyr/Glyphosate	Meadow	Concentration
Triangle Cove Mouth	No treatment	Imazapyr/Glyphosate	n/a	Off-site transport
Tarlatt Slough	Precision Broadcast	Imazapyr/Glyphosate	Meadow	Concentration
Rose Ranch	Precision Broadcast	Imazapyr/Glyphosate	Meadow	Concentration

TREATMENTS:

Spartina treatments occurred between June 1 and October 30, 2007. 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 and all provisions of the Aquatic Noxious Weed Control NPDES permit.

A total of over 1,000 acres were treated with glyphosate and imazapyr throughout the 2007 treatment season. The groups conducting control made use of integrated vegetation management (IVM) strategies; including chemical, mechanical, manual, and biological control approaches. All cooperators followed the guidelines identified in the Statewide *Spartina* IPM Plan.

SAMPLE LOCATIONS:

Within Willapa Bay, the two sampling sites for glyphosate and imazapyr concentration monitoring were chosen to correspond with locations of large scale treatments using herbicides. Rose Ranch and Tarlatt Slough are sites where management pressures have been intense during the past ten years. Monitoring in these locations is designed to detect any residual herbicide within the environment from current and past herbicide applications. Figure 1 shows the locations of the Willapa Bay sites.

Figure 1: Willapa Bay water quality monitoring Sites A) Tarlatt Slough glyphosate and imazapyr sampling location. B) Rose Ranch glyphosate and imazapyr sampling location.

In the Puget Sound, concentration and off site transport samples were collected at Triangle Cove, a location with extensive Spartina control operations. The samples were collected from within the west side Triangle Cove. The offsite transport samples were collected from the mouth of Triangle Cove. Figure two shows the location of these sites in detail.

All concentration samples were located on the landward edge of the treatment locations. These samples were collected as the tide flowed in and covered the treatment area during the first tide following herbicide application. The offsite transport samples were collected as the tide began to ebb in the first tide subsequent to treatment. All of the monitoring samples were collected within 12 hours of the cessation of treatment activities.

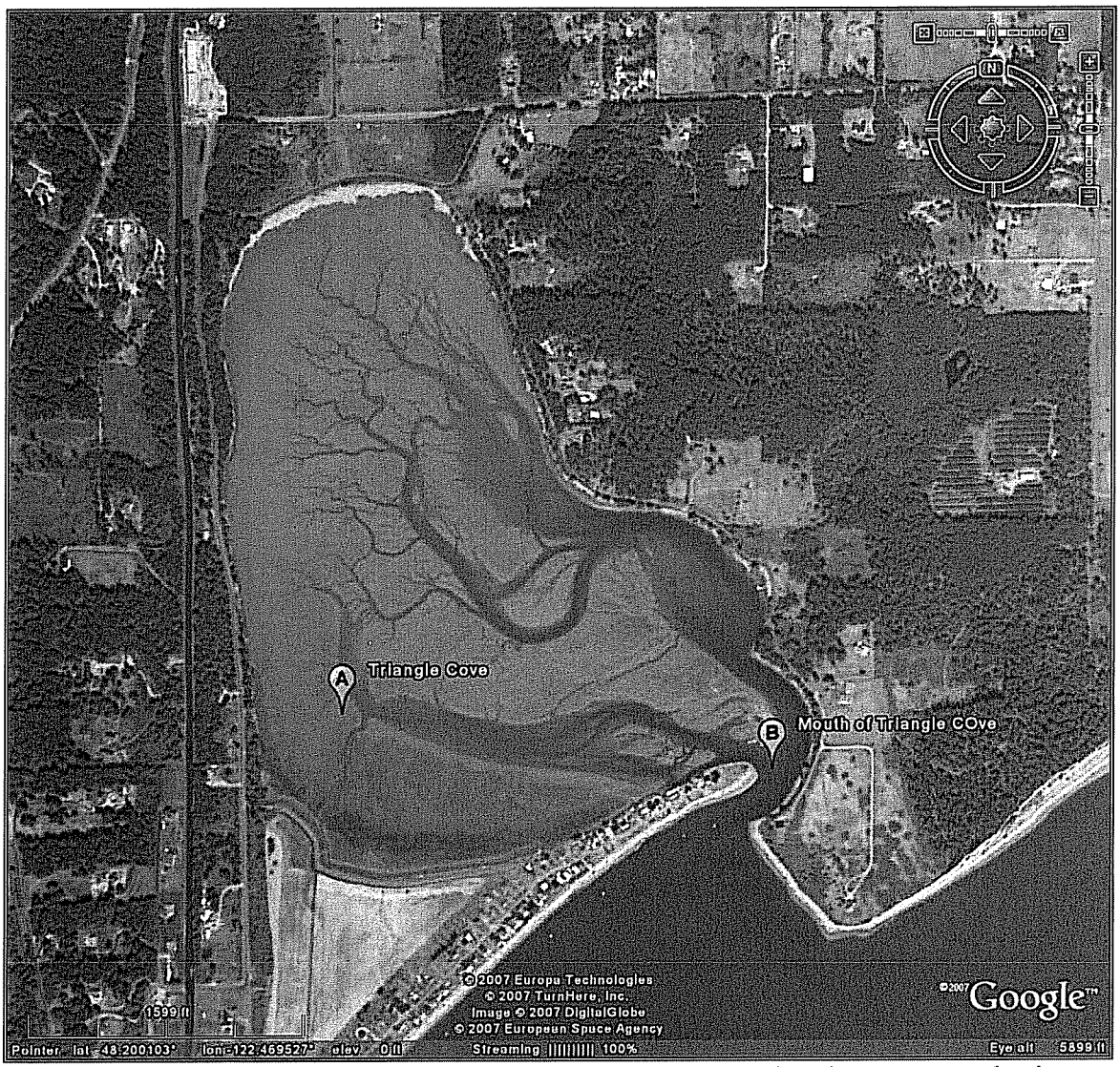

Figure 2: Triangle Cove water quality monitoring sites. A) Triangle Cove sample site for glyphosate and imazapyr concentration. B) Mouth of Triangle Cove glyphosate and imazapyr offsite transport concentrations.

SAMPLE HANDLING:

All samples were collected no sooner than the subsequent high tide after the completion of treatment to the entire site. Water depth at sampling stations ranged from 6 inches to approximately 5 feet. Samples were sent to an accredited 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 the variable timing of sampling did not allow for immediate shipping. All possible precautions were taken to avoid cross contamination, such as the use of designated glassware and equipment. 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.

SUMMARY OF IMAZAPYR PRESENCE:

The sampling for imazapyr was designed to detect presence of the herbicide directly after application at the treatments sites or as it was transported offsite. The published human health standard for imazapyr is 21,000 parts per billion (µg/L) (Montana DEQ 2006). All samples analyzed had imazapyr levels below the practical quantitative limits (PQL) of the laboratory analysis. The PQLs for these assays ranged from 0.1 to 5 parts per billion (µg/L). The PQLs are dependent upon salinity and ambient water chemistry and varied through time and by water body. Table 2 details the results of monitoring for imazapyr in 2007.

Table 2: Summary of 2007 Imazapyr Monitoring Results

Location	Sample	Sample date	Imazapyr (µg/l)	Area Treated
Triangle Cove	Pretreatment	5/24/2007	ND	
	Post treatment	9/13/2007	ND	65 Acres
Mouth of Triangle Cove	Pretreatment	5/24/2007	ND	
	Post Treatment	9/13/2007	ND	
Tarlatt Slough	Pretreatment	5/25/2007	ND	
	Post treatment	8/02/2007	ND	243 Acres
Rose Ranch	Pretreatment	8/25/2007	ND	
	Post treatment	8/24/2007	ND	29 Acres

SUMMARY OF GLYPHOSATE PRESENCE:

The sampling for glyphosate was designed to detect the presence of the chemical subsequent to treatment of *Spartina.* All samples analyzed showed glyphosate below the practical quantitative limits of the analysis. The EPA maximum contaminant level (MCL) for glyphosate is 0.7 parts per million (mg/L) (EPA 2007). The PCLs for these assays varied from 5 to 20 parts per billion. The PCLs are dependent upon salinity and ambient water chemistry and varied through time and by water body. Table 3 details the results for monitoring for glyphosate in 2007.

Table 3: Summary of 2007 Glyphosate Monitoring Results

Location	Sample	Sample date	Glyphosate (µg/l)	Area Treated
Triangle Cove	Pretreatment	5/24/2007	ND	
	Post treatment	9/13/2007	ND	65 Acres
Mouth of Triangle Cove	Pretreatment	5/24/2007	ND	
	Post Treatment	9/13/2007	ND	
Tarlatt Slough	Pretreatment	5/25/2007	ND	
	Post treatment	8/02/2007	ND	243 Acres
Rose Ranch	Pretreatment	8/25/2007	ND	
	Post treatment	8/24/2007	ND	29 Acres

SUMMARY:
In order to satisfy the requirements of the Aquatic Noxious Weed Control NPDES permit, WSDA monitors water impacted by *Spartina* control activities. During 2007, WSDA monitored for the presence of the herbicides glyphosate and imazapyr in the Puget Sound and Willapa Bay. No herbicide was detected in any of the samples analyzed during this period.

REFERENCES:

Environmental Protection Agency (EPA), 2007, National Primary Drinking Water Regulations, List of Contaminants and their Maximum Contaminant Levels (MCLs), Updated 9/10/2007 website: www.epa.gov/safewater/contaminants/index.html#mcls visited 12/27/2007

Montana Department of Environmental Quality, 2006, Circular DEQ-7, Montana Water Quality Standards, Water Quality Standards Section, Helena, MT

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.