

**I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1)
(Thrasher's Corner) Mitigation Site**

USACE IP 200401410

Northwest Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

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Author:

Doug Littauer

Editor:

Tony Bush

Contributors:

Teri Fisher

Diana Martinez


For additional information about this report or the WSDOT Wetland Assessment and Monitoring Program, please contact:

Tony Bush, Wetland Assessment and Monitoring Program
WSDOT, Environmental Services Office
P. O. Box 47332, Olympia, WA 98504
Phone: 360-570-6640 E-mail: busht@wsdot.wa.gov

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I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) (Thrasher's Corner) Mitigation Site

USACE IP 200401410

	General Site Information		
	USACE IP Number	200401410	
	Mitigation Location	West of SR 527, adjacent to Thrasher's Corner Regional Park, King County.	
	LLID Number	1222146478041	
	Construction Date	2007-2008	
	Monitoring Period	2008-2017	
	Year of Monitoring	3 of 10	
	Type of Project Impact	Wetland	Buffer
	Area of Project Impact	1.56 acres	2.91 acres
	Type of Mitigation¹	Wetland Establishment	Wetland Enhancement
	Area of Mitigation	0.14 acre	0.72 acre
	Type of Mitigation	Preservation	
	Area of Mitigation	3.22 acres	

¹ Additional wetland acreage provided by two other mitigation sites, including I-405 Forbes Lake West and I-405 Forbes Lake East. See Appendix 3.

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results ²	Management Activities
Wetland hydrology present	Wetland hydrology present in all intended areas. See Appendix 3 for complete data.	
Native woody species will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands	8 (CI _{80%} = 7-9 stems per 100 ft ²)	Replanting occurred Jan. and Feb. of 2011.
Less than 20% cover King County noxious and obnoxious weeds and invasives in wetland creation area	3 percent (qualitative)	Manual weed control occurred in Aug. & Sept. 2010 and Jan. 2011. Herbicide application occurred Sept. 2010.
After three years, aerial cover of emergent plant species will be at least 80 percent in the emergent wetland zone	94% (CI _{99%} = 90-97% cover)	

Report Introduction

This report summarizes third-year (Year-3) monitoring activities at the Interstate (I) 405 Thrashers Corner Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site development. Monitoring activities include vegetation surveys, photo-documentation, and assessments of wetland hydrology. Vegetation surveys occurred on July 6th and 7th, and hydrology visits took place on February 24th, March 9th, and March 24th.

² Estimated values are presented with their corresponding statistical confidence interval. For example, 8 (CI_{80%} = 7-9 stems per 100ft²) means we are 80% confident that the true density is between 7 and 9 stems per 100 square feet.

What is the I-405 Thrasher's Corner Mitigation Site?

This 4.7-acre mitigation site (Figure 1) is located in the City of Bothell, within the North Creek basin. Adjacent to existing wetlands, this site is part of a larger wetland complex associated with North Creek. This site was constructed to partially compensate for impacts to 1.56 acres of wetland and 2.91 acres of wetland buffer due to road widening and construction of stormwater facilities along I-405. It is intended to provide mitigation for lost habitat functions. Two mitigation sites provide additional compensation for project impacts: I-405 Forbes Lake West and I-405 Forbes Lake East. To view a table detailing mitigation acreage at the three projects, see Appendix 3.

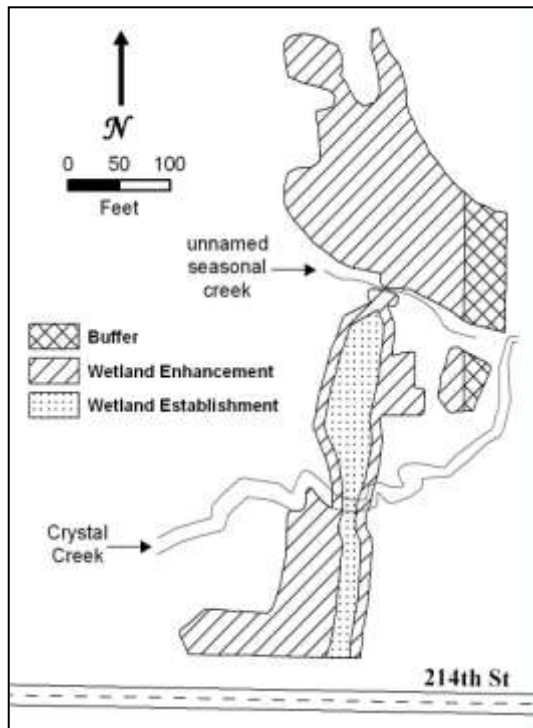


Figure 1 Site Sketch

The I-405 Thrasher's Corner Mitigation Site contains a narrow wetland establishment (formerly called creation) area surrounded by wetland enhancement. Part of the existing roadbed was left ungraded to protect existing trees, resulting in 0.07 acre less wetland establishment than originally intended. Buffer enhancement borders the site to the east. Crystal Creek and the unnamed seasonal stream, both flow east through the wetland zones.

What are the performance criteria for this site?

Performance Standard 1

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least 2 consecutive weeks (5 percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

Performance Standard 2

Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands.

Performance Standard 3

Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

Performance Standard 4

After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 4 shows the as-built planting plan (WSDOT 2008).

How were the performance standards evaluated?

To evaluate standards for vegetative cover, a baseline was established through the center of the site and a second baseline was oriented through the center of the emergent areas (Figure 2). Twenty-four sampling transects were randomly placed perpendicular to the main baseline. The unequal-area belt transect method was used to estimate woody density (Performance Standard 2). Eleven sampling transects were randomly placed perpendicular to the herbaceous baseline. The point intercept method was used to estimate emergent cover (Performance Standard 4). The cover of noxious and obnoxious weeds in the established wetland was estimated qualitatively (Performance Standard 3).

WSDOT staff collected hydrology data using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997) (Performance Standard 1). Four permanent hydrology pit locations were established in Year-1 of monitoring and recorded on a map (Appendix 3). During each monitoring visit, visual observations are made to determine the extent of inundation and surface saturation. Depth and location of standing water is recorded. At each pit location, in the absence of inundation or surface saturation, subsurface observations are made.

For additional details on the methods, see Appendix 2 of this report or view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

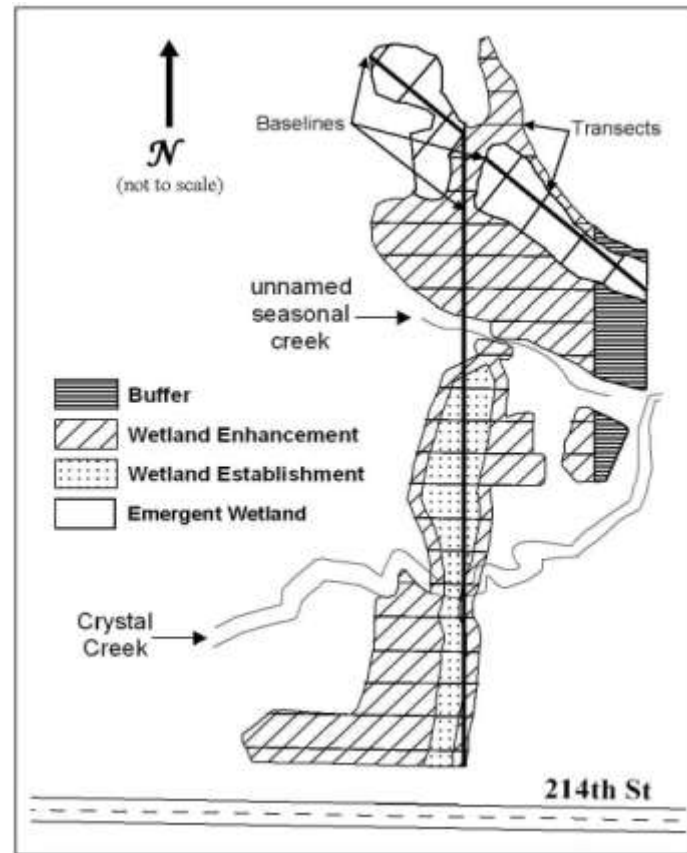


Figure 2 Site Sampling Design (2010)

How is the site developing?

Vegetation communities on this site have developed rapidly. The established wetland contains dense communities of both deciduous and coniferous trees, as well as a diverse layer of shrub species. Invasive cover across the site is relatively low, and these species are only present in trace amounts in the established wetland. Twenty avian species were observed during summer vegetation monitoring as well as amphibian species such as red-legged frog.

Results for Performance Standard 1
(Wetland hydrology):

Hydrology visits in the month of February and March, 2010 show that this site achieved the hydrology standard this year in all intended wetland areas (Photo 1). Results from two hydrology sampling location were not included because they were located in an area that is no longer part of the intended wetland (see results in Appendix 3, Table 1). These pits will be relocated in 2011.

Results for Performance Standard 2
(Native woody density of 4 plants/100 ft² in the forested and scrub-shrub wetland):

The density of native woody species in the scrub-shrub and forested wetland communities is 8 stems/100 ft² (CI_{80%} = 7 – 9) (Photo 2). Dominant species observed in this zone include red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), salmonberry (*Rubus spectabilis*), and Sitka spruce (*Picea sitchensis*). While most species are thriving, several Sitka spruce are experiencing tip die-back but are still alive and will likely survive.



Photo 1 Shallow inundation in the established wetland (March 2010)



Photo 2 Woody cover in established wetland (July 2010)

Results for Performance Standard 3

(No more than 20% cover of King County Class A weeds including reed canarygrass, non-native blackberries, purple loosestrife, Scot’s broom, and Japanese knotweed in the wetland creation area):

The aerial cover of invasive species in the established wetland is qualitatively estimated at three percent. This value is well below the performance standard threshold. Invasive species observed in the established wetland included Himalayan blackberry (*Rubus armeniacus*) and reed canarygrass (*Phalaris arundinacea*). Control of these species will continue in 2011.

Results for Performance Standard 4

(Aerial cover of emergent plant species will be at least 80 percent in the emergent wetland zone):

The aerial cover of native herbaceous species in the emergent zone is 94% (CI_{99%} = 90-97%). This cover value exceeds the performance standard target (Photo 3). Dominant species observed in this zone included broadleaf cattail (*Typha latifolia*), soft rush (*Juncus effusus*), and small-fruited bulrush (*Scirpus microcarpus*).



Photo 3
Emergent cover in Wetland 2 (July 2010)

What is planned for this site?

Continued weed control through the 2011 growing season is planned for this site. The health of the Sitka spruce will be monitored and dead plants will be replaced if necessary.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *I-405, SR522 to SR520 Kirkland Nickel Project Wetland Mitigation Plan* (WSDOT 2005). The performance criteria addressed this year are identified in **bold** font.

GOALS AND OBJECTIVES

The mitigation goals for the Thrasher’s Corner site include:

- Establish native tree, shrub and/or groundcover vegetation communities (emergents, herbs and ferns) in the wetland creation and enhancement areas;
- Establish native tree, shrub and/or groundcover vegetation communities in the wetland buffer areas;
- Establish wetland hydrology in the wetland creation areas.
- Provide improved wildlife habitat through the installation of standing dead coniferous snags for perching and nesting opportunities for birds; and installation of large woody debris for cover opportunities for small mammals, birds and amphibians.

Objective – Hydrology

Establish wetland hydrology in a minimum of 0.210 acre.

Interim Performance Measures (Monitoring Years 1-9)

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least 2 consecutive weeks (5 percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

Success Standard (Year 10)

Wetland areas will be delineated using methods described in the Washington State Wetlands Identification manual (Ecology, 1997) to assure that the mitigation site contains at least 0.927 acre of created and enhanced wetland (this includes 0.074 acre of creation to be allocated to a future WSDOT project).

Objective – Wetland Vegetation

Establish native tree, shrub and/or groundcover vegetation communities (emergents, herbs, and ferns) in the wetland creation and enhancement areas.

Interim Performance Measures

Performance Measure 1 (Year 1): Planted woody species in the wetland will achieve 100 percent survival at the end of the first year plant establishment period. If all dead woody plantings are replaced, the performance measure will be met.

Performance Measure 2 (Year 3): Native woody species (planted and volunteer) will maintain a stem density of four plants per 100 square feet in the forested and scrub-shrub wetlands.

Performance Measure 3 (Year 5): After five years, aerial cover of native woody species will be at least 50 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Performance Measure 4 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the emergent wetland zone by Year 5.

Performance Measure 5 (Year 5): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 5 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 5.

Performance Measure 6 (Year s 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot’s broom and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

Success Standards

Success Standard 1 (Year 3): After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

Success Standard 2 (Year 10): After 10 years, aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Success Standard 3 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 8 percent relative cover for each species in the emergent wetland zone by Year 10.

Success Standard 4 (Year 10): At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

Success Standard 5 (Years 1-9): Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

Appendix 2 – Methods

To evaluate standards for vegetative cover, a baseline was established through the center of the site and a second baseline was oriented through the center of the emergent areas (Figure 2). Twenty-four sampling transects were randomly placed perpendicular to the main baseline. The unequal-area belt transect method was used to estimate woody density (Performance Standard 2). One-meter wide belt transects were placed along the length of each transect. Eleven sampling transects were randomly placed perpendicular to the herbaceous baseline. The point intercept method was used to estimate emergent cover (Performance Standard 4). Eleven randomly positioned 5-meter point-line sample units (20 points each) were placed along the sampling transects across the site. The cover of noxious and obnoxious weeds in the established wetland was estimated qualitatively (Performance Standard 3).

Sample size analysis confirmed sufficient sampling had been completed based on site sampling objectives and the desired level of statistical confidence. The sample size equation shown here (below) was used to perform the analysis on data collected (Performance Standard 4). In this equation, the precision level (*B*) equals half the maximum acceptable confidence interval width multiplied by the sample mean.

$$n = \frac{(z)^2 (s)^2}{(B)^2}$$

n = unadjusted sample size
z = standard normal deviate
s = sample standard deviation
B = precision level

WSDOT staff collected hydrology data using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997) (Performance Standard 1). Four permanent hydrology pit locations were established in Year-1 of monitoring and recorded on a map. During each monitoring visit, visual observations are made to determine the extent of inundation and surface saturation. Depth and location of standing water is recorded. At each pit location, in the absence of inundation or surface saturation, subsurface observations are made.

For additional details on the methods view the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

Appendix 3 – Data Tables

Table 1 - Hydrology Observations (2010)³

Date	Surface Observations	Subsurface Observations	
2/24/2010	Few small areas of saturation or inundation in creation area. Most enhancement areas are saturated to the surface with small areas of inundation. Pits south of the creek had hydrology and pits north of the creek did not.	Pit 3	standing water at 11" after 20 minutes
		Pit 4	standing water at 11.5" after 20 minutes
3/9/2010	Few small areas of saturation or inundation in creation area. Pits south of the creek had hydrology and pits north of the creek did not.	Pit 3	standing water at 11.5"
		Pit 4	standing water at 10"
3/24/2010	Very little surface hydrology in establishment area. Enhancement area north of creek saturated to the surface or shallowly inundated.	Pit 3	Standing water at 11"
		Pit 4	Standing water at 13" and saturation at 11" after 33 minutes

³ Data from hydrology pits 1 and 2 was not included because these pits were located in an area that is now considered upland. These pits will be relocated into intended wetland areas in 2011.

Hydrology Pit Locations

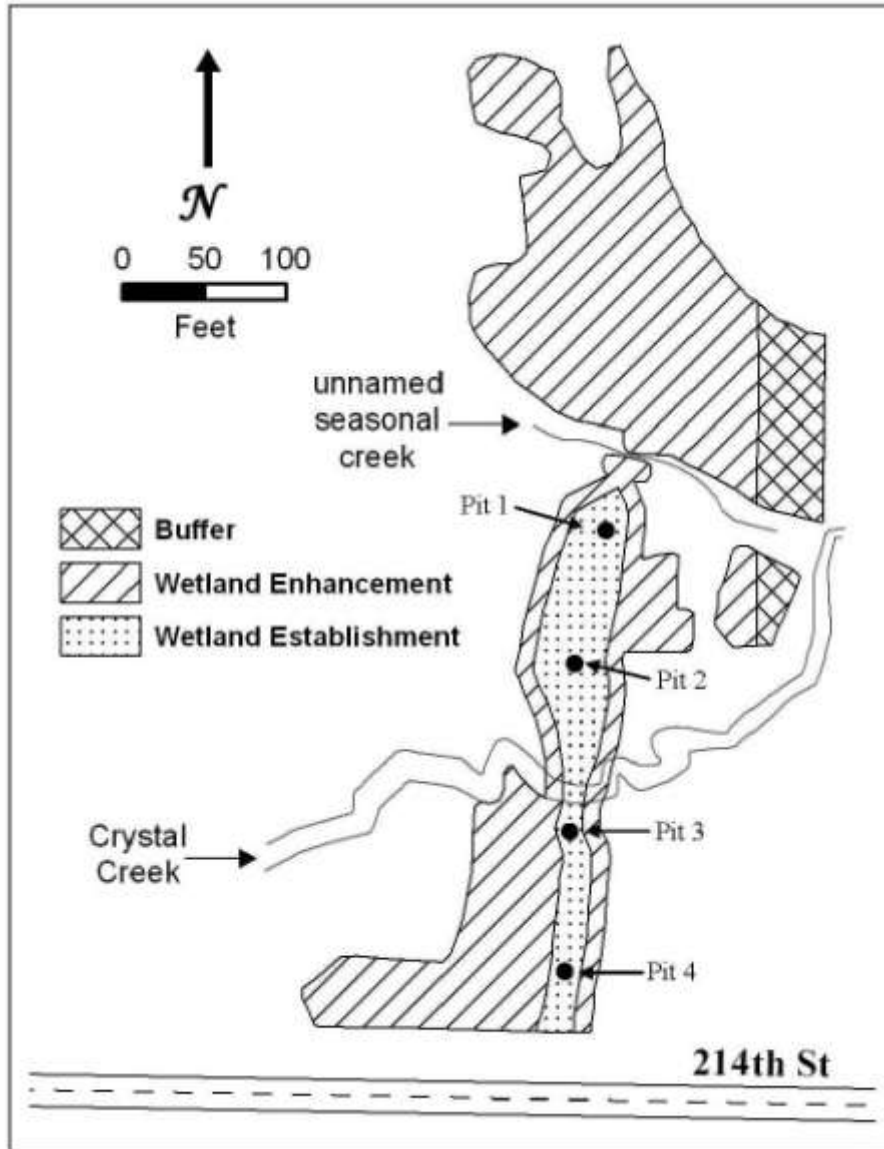


Table 2 – Constructed Mitigation Acreage at Wetland Mitigation Sites Associated with the I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) Project

Site	Mitigation Type	Proposed	Changes	Constructed
Forbes Lake West	Creation	0.56	-0.30	0.26
	Enhancement	0.86	-0.40	0.46
	Preservation	0.74		0.74
	Buffer/upland	0.05	0.70	0.75
Forbes Lake East	Creation	1.62		1.62
	Enhancement	0.57		0.57
	Buffer/upland	1.49		1.49
Thrasher's Corner	Creation	0.21	-0.01	0.20
	Enhancement	0.72		0.72
	Preservation	3.22		3.22
	Buffer/upland	0.00	0.01	0.01

Appendix 5 – Photo Points

The photographs below were taken from permanent photo-points on July 7th, 2010 and document current site development.



Photo Point 1

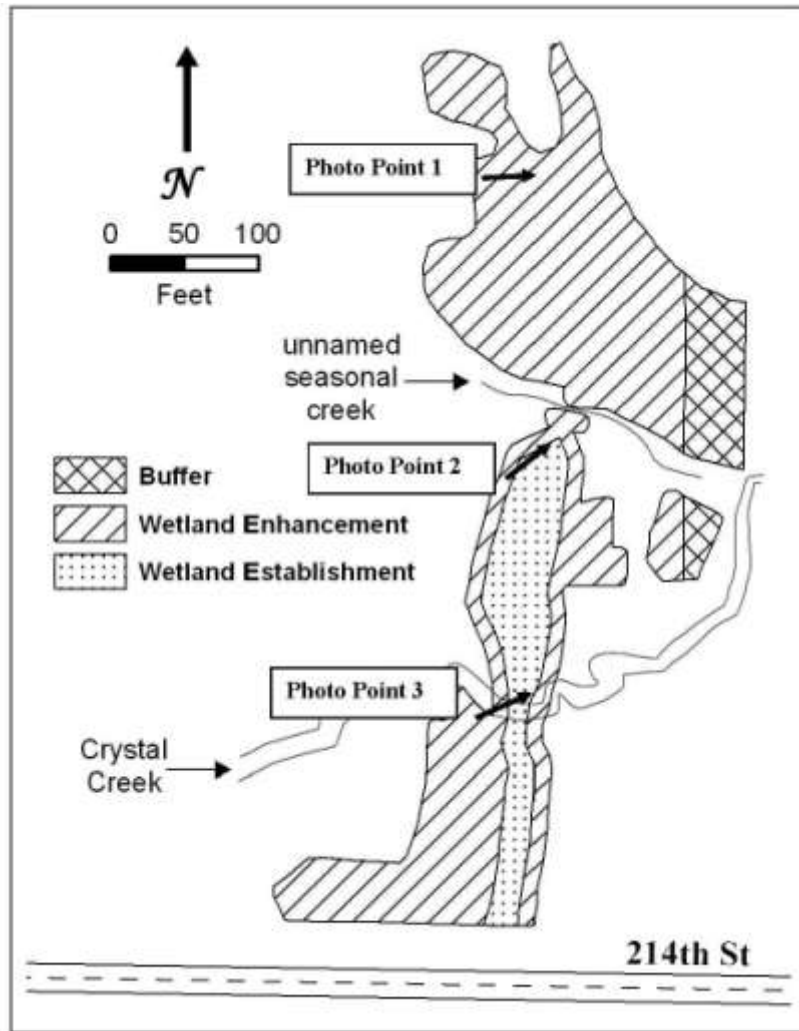


Photo Point 2



Photo Point 3

Photo point Map



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