

**US 101 Sequim Bypass Corridor Milepost 262.34 to 267.43
Mitigation Site**

USACE IP 199600923

Olympic Region

2010 MONITORING REPORT

Wetland Assessment and Monitoring Program

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US 101 Sequim Bypass Corridor Milepost 262.34 to 267.43 Mitigation Site

USACE IP 199600923

	General Site Information	
	USACE IP Number	199600923
	Mitigation Location	One mile east of the center of Sequim, on Bell Creek, Clallam Co.
	LLID Number	1230701480831
	Construction Date	2000
	Monitoring Period	2001-2010
	Year of Monitoring	10 of 10
	Area of Project Impact	8.94 acres
	Type of Mitigation	Restoration/Enhancement
	Area of Mitigation	33 acres

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Summary of Monitoring Results and Management Activities (2010)

Performance Standards	2010 Results	Management Activities
Riparian corridor along Bell Creek shall provide more than 40% cover	South side of stream: 99% cover North side of stream: 88% cover	
Exclude cattle from the mitigation site	No cattle or cattle sign observed on site	Fence repair

Report Introduction

This report summarizes final-year (Year-10) monitoring activities at the US 101 Sequim Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site success. Monitoring activities included vegetation surveys, photo-documentation, assessments of wetland hydrology, and a wetland delineation.

What is the US 101 Sequim Mitigation Site?

This 57.43-acre mitigation site (Figure 1) northeast of Sequim, combines wetland restoration, enhancement, and preservation as well as riparian corridor and stream realignment. This site was created to compensate for the loss of 8.94 acres of wetland and advanced mitigation for an additional 6.89 acres of wetlands. The wetland losses result from the creation of a bypass road on US 101 to relieve congestion and improve safety in Sequim. Emergent, open water and buffer areas were created to diversify habitat, enhancing existing scrub-shrub and forested wetland communities. The addition of large woody debris, perch poles, and bat boxes increase habitat value and function. Bell Creek was realigned, creating a riffle and pool complex, improving habitat for anadromous fish, amphibians, and aquatic macroinvertebrates.



Figure 1 Site Sketch

The US 101 Sequim Mitigation Site has scrub-shrub and forested wetland communities in addition to riparian, open water and emergent habitats. Bell Creek and a forested buffer comprise the southern site boundary.

What are the performance standards for this site?

Performance Standard 1

Provide a riparian corridor along Bell Creek which provides some shade along a minimum of 40 percent of the stream corridor after 10 years.

Performance Standard 2

Exclude cattle from the mitigation site.

Appendix 1 provides the complete text of the performance standards for this project, and Appendix 3 shows the planting plan (Schlatter and Ward, 1997).

How were the performance standards evaluated?

WSDOT staff performed a wetland delineation using methods described in the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997) and a Global Positioning System (Trimble TSCI data logger).

To evaluate shade from shrubs and trees along Bell Creek (Performance Standard 1), a baseline was established parallel to the creek. Estimated heights were determined for all woody species rooted within ten meters of the creek edge. The length of the baseline was recorded where woody species three feet or greater in height were established. The sum of those baseline lengths were compared to the total length of the baseline to determine the percent of the Bell Creek corridor that is shaded or supporting woody species three feet or greater in height.

Site observations were made to determine if cattle were actively using the site (Performance Standard 2).

Incidental observations and bird surveys were conducted to evaluate wildlife use at the site.

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

Is this site a success?

The Sequim Mitigation site has continually met the yearly Performance Standards as written in the Mitigation Plan. There are several functions identified as important for the Sequim mitigation site, specifically wildlife habitat, fisheries habitat, and water quality improvement.

Monitoring tasks directly related to supporting wildlife habitat functions include amphibian monitoring, vegetative strata, and habitat structures, perch poles and snags. The presence of shallow open water for egg laying and the presence of native amphibians have been well documented at this site during the course of the monitoring period. See Appendix 2, Table 2 for a table of species observed during a formal survey in 2004. In addition to this survey, yearly qualitative observations over the course of the monitoring period repeatedly report the presence of red legged frogs (Photo 1). Three yearly spring bird surveys have continued throughout the ten year monitoring period. Many species observed are wetland dependant. See Appendix 2, Table 1 for a list of species observed. Mature conifers, broadleaved trees, shrubs and open spaces exist across the site offering habitat with several strata.

The relocated Bell Creek has exceeded the Year-10 standard for shade, supporting fish habitat in the stream. The large woody debris placed in the stream at the time of construction are still present and functional. Macroinvertebrate sampling was completed in the stream twice during the monitoring

period. Several species are present, including species from the orders Ephemeroptera, Plecoptera, and Trichoptera; indicating not only an improvement in water quality but providing an important food source for native fish species.

A delineation of wetland acreage at this site was completed in 2010. The results indicate 27.4 acres of restored wetland is present, in excess of the required acreage of 25 acres (See the delineation report (WSDOT 2011) for further discussion).



Photo 1
Red Legged Frog (July 2007)

Results for Performance Standard 1

(Riparian corridor along Bell Creek shall provide more than 40% cover):

The cover along the south side of Bell Creek is 99 percent and 88 percent on the north side of the creek (Photo 2). This exceeds the standard. The dominant species in this area is red alder (*Alnus rubra*) at approximately fifteen meters tall. Sub-dominant species include western red cedar (*Thuja plicata*), Indian plum (*Oemleria cerasiformis*), and snowberry (*Symphoricarpos albus*).

Results for Performance Standard 2

(Exclude cattle from the mitigation site):

At the time of vegetation monitoring in August, 2010, there was no evidence of cattle on site. An inspection of the perimeter fencing revealed sections of the fence leaning and in disrepair. It was later reported by the restoration crew that the fence was completely broken and cattle were observed on site. The region has plans to coordinate repair and maintenance of the fence line to continue to again exclude cattle from the site.



Photo 2
Woody cover along Bell Creek (August 2010)

What is planned for this site?

The region has plans to continue working with the adjacent landowner to fix the fence and exclude cattle from the site and continue with ongoing weed control.

Appendix 1 – Goals and Performance Standards

The following excerpt is from the *US 101 Sequim Bypass Corridor Milepost 262.34 to 267.43 Wetland Mitigation Plan* (Ward and Schlatter 1997). The standards addressed this year are identified in **bold** font.

GOALS AND OBJECTIVES

The following functions have been identified as important for the Sequim mitigation site.

1. Wildlife Habitat
2. Fisheries Habitat
3. Water Quality Improvement
4. Base flow support for Bell Creek

Of these four functions, it was decided that while #4 was very important, it was difficult to quantify as a performance standard, thus it was not included as a goal or performance standard in the mitigation plan.

The following are included as goals, objectives and performance standards.

Goals

To restore, preserve, and enhance wetlands on 23.25 ha (57.43 acres) site. An existing approximately 6.88 ha (17 acres) forested wetland will be preserved. Approximately 13.36 ha (33 acres) of wetland and wildlife habitat will be restored and enhanced. 3.24 ha (8 acres) will be a site buffer and riparian corridor. Emergent and open water habitats will be added to complement the existing shrub and forested wetland habitats to increase wildlife habitat diversity and enhance anadromous fish habitat. The site will be protected by a vegetated buffer along the southern end of the site and will be fenced to exclude cattle, improving the water quality in the wetlands.

Objective A

Restore 13.36 ha (33 acres) of the site to wetland conditions.

Standard A-1

A minimum of 10.12 ha (25 acres) will be restored to wetland conditions as determined by a wetland delineation completed in Year 5.

Methods:

The wetland shall be reestablished by installing ditch plugs and excavating shallow level spreader ditches to restore the wetland hydrology to the site.

Monitoring:

The delineation shall confirm the presence of hydrology. Hydrology will be monitored during the monitoring period.

Objective B

Increase wildlife habitat types and diversity by providing habitat for amphibians, increase structural diversity for birds, and by installing habitat structures.

Standard B-1

By Year 5 the site will provide suitable breeding habitat for frogs and salamanders. Species presence will be documented by live capture of adults or larvae, or observation of adults, larvae or egg masses.

Methods:

Excavate shallow ponds and plant a diversity of emergent species, providing a variety of stem diameters and water depths for egg deposition. Install plugs in ditches to allow for the creation of additional breeding areas.

Monitoring:

Use the appropriate technique depending upon the time of year. Egg mass surveys can be completed during the breeding season, or larvae can be trapped or dip-netted during the larval rearing season, or adults can be observed year-round or during the breeding season.

Standard B-2

Achieve a minimum of 70 percent survival of tree and shrub plantings by the end of Monitoring Year 1 on the site in both the wetland and buffer area.

Methods:

Create shrub and forested habitat areas within the existing pasture by planting groups of trees and shrubs. Establish a buffer along the southern portion of the site.

Monitoring:

Count number of dead and live tree and shrub seedlings.

Standard B-3

Install by the end of Monitoring Year 1 a minimum of 5 snags as perch trees, a minimum of 5 large woody debris piles and at least 10 bat boxes.

Methods:

Install according to plans.

Monitoring:

Document presence at completion of construction. Locate structures on as-built plans. While no specific monitoring of use is required, visual inspection of each bat box for guano and inspection of the ground under each perch tree for whitewash and pellets during the site inspections should be done opportunistically.

Objective C

Create and enhance fish habitat in Bell Creek.

Standard C-1

By the end of Monitoring Year 1, 75% of relocated Bell Creek will be a pool and riffle complex.

Methods:

Relocate Bell Creek according to the plans.

Monitoring:

Complete the following measurements on Bell Creek, total relocated length, length of each pool, and length of each riffle.

Standard C-2

Install a minimum of 20 instream structures to provide cover for fish by Monitoring Year 1.

Methods:

Installation of structures will occur according to plan.

Monitoring:

Count number of installed structures in Monitoring Year 1.

Standard C-3

Provide a riparian corridor along Bell Creek which provides some shade along a minimum of 40 percent of the stream corridor after 10 years.

Methods:

Plant a riparian community along the banks of relocated Bell Creek.

Monitoring:

Measure the total length of the relocated creek, and measure length of all riparian areas supporting vegetation over three feet tall to determine percent of stream corridor which is shaded.

Objective D

Reduce the opportunity of the water in the on-site portion of Bell creek and in the on-site portion of the wetland to become polluted with nitrates from cow manure.

Standard D-1

Exclude cattle from the mitigation site.

Methods:

Fence site with a cattle proof fence where there are active pastures adjacent.

Monitoring:

Visually inspect the site for cattle or signs of cattle intrusion.

Appendix2 – Data Tables

Table 1 – Bird species observed over the 10 year monitoring period

Common name	Scientific Name	Family	Wetland Dependent Status
Great Blue Heron	<i>Ardea herodias</i>	<i>Ardeidae</i>	wetland-dependent
Turkey Vulture	<i>Cathartes aura</i>	<i>Cathartidae</i>	wetland-independent
Canada Goose	<i>Branta canadensis</i>	<i>Anatidae</i>	wetland-dependent
Gadwall	<i>Anas strepera</i>	<i>Anatidae</i>	wetland-dependent
Mallard	<i>Anas platyrhynchos</i>	<i>Anatidae</i>	wetland-dependent
Blue-winged Teal	<i>Anas discors</i>	<i>Anatidae</i>	wetland-dependent
Bald Eagle	<i>Haliaeetus leucocephalus</i>	<i>Accipitridae</i>	wetland-associated
Red-tailed Hawk	<i>Buteo jamaicensis</i>	<i>Accipitridae</i>	wetland-independent
California Quail	<i>Callipepla californica</i>	<i>Phasianidae</i>	wetland-independent
Virginia Rail	<i>Rallus limicola</i>	<i>Rallidae</i>	wetland-dependent
Wilson's Snipe	<i>Gallinago delicata</i>	<i>Scolopacidae</i>	wetland-dependent
Glaucous-winged Gull	<i>Larus glaucescens</i>	<i>Laridae</i>	wetland-associated
Rock Pigeon	<i>Columba livia</i>	<i>Columbidae</i>	wetland-independent
Band-tailed Pigeon	<i>Columba fasciata</i>	<i>Columbidae</i>	wetland-independent
Mourning Dove	<i>Zenaida macroura</i>	<i>Columbidae</i>	wetland-independent
Barred Owl	<i>Strix varia</i>	<i>Strigidae</i>	wetland-independent
Rufous Hummingbird	<i>Selasphorus rufus</i>	<i>Trochilidae</i>	wetland-independent
Belted Kingfisher	<i>Ceryle alcyon</i>	<i>Alcedinidae</i>	wetland-dependent
Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	<i>Picidae</i>	wetland-independent
Northern Flicker	<i>Colaptes auratus</i>	<i>Picidae</i>	wetland-independent
Olive-sided Flycatcher	<i>Contopus borealis</i>	<i>Tyrannidae</i>	wetland-independent
Western Wood-Pewee	<i>Contopus sordidulus</i>	<i>Tyrannidae</i>	wetland-independent
Willow Flycatcher	<i>Empidonax traillii</i>	<i>Tyrannidae</i>	wetland-associated
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	<i>Tyrannidae</i>	wetland-independent
Warbling Vireo	<i>Vireo gilvus</i>	<i>Vireonidae</i>	wetland-associated
Steller's Jay	<i>Cyanocitta stelleri</i>	<i>Corvidae</i>	wetland-independent
American Crow	<i>Corvus brachyrhynchos</i>	<i>Corvidae</i>	wetland-independent

Common Raven	<i>Corvus corax</i>	Corvidae	wetland-independent
Tree Swallow	<i>Tachycineta bicolor</i>	Hirundinidae	wetland-associated
Violet-green Swallow	<i>Tachycineta thalassina</i>	Hirundinidae	wetland-associated
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Hirundinidae	wetland-associated
Cliff Swallow	<i>Hirundo pyrrhonota</i>	Hirundinidae	wetland-independent
Barn Swallow	<i>Hirundo rustica</i>	Hirundinidae	wetland-associated
Black-capped Chickadee	<i>Poecile atricapillus</i>	Paridae	wetland-associated
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Sittidae	wetland-independent
Bewick's Wren	<i>Thryomanes bewickii</i>	Troglodytidae	wetland-independent
Marsh Wren	<i>Cistothorus palustris</i>	Troglodytidae	wetland-dependent
Swainson's Thrush	<i>Catharus ustulatus</i>	Turdidae	wetland-independent
American Robin	<i>Turdus migratorius</i>	Turdidae	wetland-independent
European Starling	<i>Sturnus vulgaris</i>	Sturnidae	wetland-independent
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Bombycillidae	wetland-independent
Orange-crowned Warbler	<i>Vermivora celata</i>	Parulidae	wetland-independent
Yellow Warbler	<i>Dendroica petechia</i>	Parulidae	wetland-associated
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	Parulidae	wetland-independent
Common Yellowthroat	<i>Geothlypis trichas</i>	Parulidae	wetland-dependent
Western Tanager	<i>Piranga ludoviciana</i>	Thraupidae	wetland-independent
Spotted Towhee	<i>Pipilo maculatus</i>	Emberizidae	wetland-independent
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Emberizidae	wetland-independent
Song Sparrow	<i>Melospiza melodia</i>	Emberizidae	wetland-independent
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	Emberizidae	wetland-independent
Dark-eyed Junco	<i>Junco hyemalis</i>	Emberizidae	wetland-independent
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	Cardinalidae	wetland-independent
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Icteridae	wetland-dependent
Brown-headed Cowbird	<i>Molothrus ater</i>	Icteridae	wetland-independent
House Finch	<i>Carpodacus mexicanus</i>	Fringillidae	wetland-independent
American Goldfinch	<i>Carduelis tristis</i>	Fringillidae	wetland-independent
House Sparrow	<i>Passer domesticus</i>	Passeridae	wetland-independent

Table 2 Results of formal survey in 2003

Species	Adult	Juvenile	Larvae	Egg Mass
Pacific chorus frog (<i>Pseudacris regilla</i>)	X			
Cope's giant salamander (<i>Dicamptadon copei</i>)	X			
Northwestern salamander (<i>Ambystoma gracile</i>)	X	X		
Red-legged frog (<i>Rana aurora</i>)	X	X		X
Rough-skinned newt (<i>Taricha granulose</i>)	X		X	

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