

Crystal River Ranch Upland Erosion Control Project

December 2014 CRR Restoration Status Report

Reference:

PALS Permit No. 695650, Development Eng. File No. 56-15

WDFW Hydraulic Permit No. 112720-2

Pierce County parcels: 3360090210, 3360041404, 3360050800

Project Overview:

- December 2010 fourteen buried rock vanes installed.
- April 2011 plantings 767 individually wire caged to discourage elk damage and submittal of baseline report (RestorCRR_BaselineRpt_20110428) as required to Pierce County Planning & Land Services (PALS).
 - Sitka willow (*Salix sitchensis*), Birch (*Betula papyrifera*) planted in low terrace vane cluster sites V1, V2-4, V10-12 & V13-14.
 - Douglas fir (*Pseudotsuga menziesii*), Sitka spruce (*Picea sitchensis*), Western hemlock (*Tsuga heterophylla*) planted in high terrace vane sites V5-9.
- July 2011 PALS approved “as-built” construction.
- March - April 2012 Wire cages removed from Douglas fir, Hemlock and Spruce.
 - Cages, stakes and debris clean-up accomplished at high terrace vane site locations.
- August - October 2012 Majority of scotch broom pulled at all sites and vanes V1, V5-7 irrigated.
- June - October 2013 Additional irrigation installed at more vane sites and was consistently operated through summer months. Resident elk herd consuming Birch and Sitka willow branch growth. Majority of dead plants removed and replaced with Douglas fir.
- July - December 2014 Resident elk herd consuming Birch and Sitka willow branch growth outside protective cages. Douglas fir replanting = 4. Majority of scotch broom pulled at all vane sites. Vane 14 shoreline 18 ft. to 20 ft. eroded since 2010. At vane 14 toe rock is exposed and 1 mature shoreline 2010 Alder lost Nov 2014 and another 2010 mature Alder in upstream proximity Dec 16, 2014 leaning over channel.

Definitions:



Vigor: 1) “Good” means plant exhibits lots of new vegetative growth, and/or flowers.
2) “Fair” means the plant is green, erect without exhibiting new growth, little if any infestations.
3) “Poor” means no evidence of new growth such as shoots, sprouting branches, flowers.

Volunteer plants included in live quantities.

Survival % calculation: Divide “live plants” 2014 quantity by “planted Apr 2011” quantity = survival % for each vane site.

Survival Plant Status Each Vane Site:

Vane 1 length 107 feet located inland shoreline CRR picnic area off Willow Tree Way.



Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Sitka willow	3-4 ft	Fair	1	Planted Apr 2011 = 40	
Birch	6-7 ft	Fair	17	Vane 1 plant survival exceeds 80%	
Birch	4-5 ft	Fair	2		
Doug fir	4-5 ft	Good	2		
	2-3 ft	Good	13		
	2-3 ft	Fair	4		
	1 ft+	Good	6		
Live plants:			45		
<p>N 47° 06.654', W 121° 36.305' at shoreline vane stake (toe end).</p> <p>3 Foot approximate OHW (ordinary high water) bank height.</p>					
				V1 Downstream 11/22/2014	

Toe 11/22/2014

V1 Downstream 11/22/2014

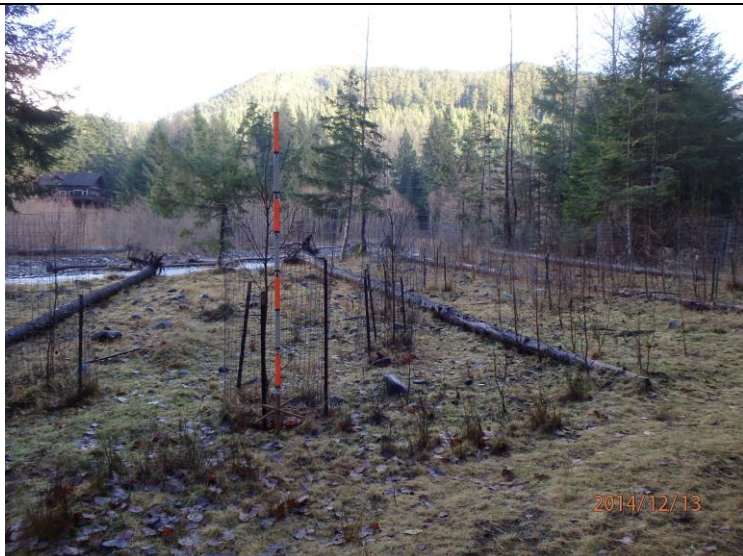

Vane 1 live plants quantity 45 divided by planted April 2011 quantity 40 exceeds 80%+ survival

Vane 2 length 123 feet located inland downstream of old bridge abutment off Meadow Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Doug fir	3-4 ft	Good	4	Planted Apr 2011 = 49	
Sitka willow	4 ft	Fair	1	Vane 2 plant survival exceeds 80%	
Birch	7-8 ft	Fair	4		
Birch	5-6 ft	Fair	5		
Alder	9-10 ft	Good	2		
Alder	7-8 ft	Good	7		
Alder	4-6 ft	Good	23		
Alder	2-3 ft	Good	17		
Live Plants:			63		Heel 11/22/2014
N 47° 06.518', W 121° 36.153' at shoreline vane stake. 3 Foot approximate OHW bank height.					
					V2 Upstream12/13/2014

Vane 2 live plants quantity 63 divided by planted April 2011 quantity 49 exceeds 80%+ survival

Vane 3 length 107 feet located inland downstream of old bridge abutment off Meadow Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Sitka willow	4-6 ft	Fair	3	Planted Apr 2011 = 43	
Birch	7-8 ft	Fair	9	Vane 3 plant survival exceeds 80%	
Birch	5-6 ft	Fair	10		
Doug fir	2-3 ft	Good	2		
Alder	7-8 ft	Good	3		
Alder	4-6 ft	Good	54		
Live Plants:			81		
N 47° 06.560', W 121° 36.106' at shoreline stake (toe) of vane.					
3 Foot approximate OHW (ordinary high water) bank height.					

2014/12/13

Heel 12/13/2014

2014/12/13



V3 Upstream 12/13/2014

Heel 12/13/2014

V3 Upstream 12/13/2014


Vane 3 live plants quantity 81 divided by planted April 2011 quantity 43 exceeds 80%+ survival

Vane 4 length 111 feet located inland downstream of old bridge abutment off Meadow Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Access Route / Heel 12/13/2014
Sitka willow	4-5 ft	Fair	8	Planted Apr 2011 = 38	
Birch	7-8 ft	Fair	2	Vane 4 plant survival exceeds 80%	
Birch	5-6 ft	Fair	17		
Alder	7-8 ft	Good	2		
Alder	4-6 ft	Good	33		
Alder	2-3 ft	Good	29		
Live Plants:			91		
N 47° 06.531', W 121° 36.072' at shoreline stake (toe) of vane. 3 Foot approximate OHW (ordinary high water) bank height.					 V4 Toe 12/13/2014

Vane 4 live plants quantity 91 divided by planted April 2011 quantity 38 exceeds 80%+ survival


Access route to vanes 2-4 next to bridge abutment end of Meadow Way.

Access Route	Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
V2 - 4	Birch	8-9 ft	Fair	2	Planted Apr 2011 = 6	
V2 - 4	Birch	6-7 ft	Fair	3	Access route plant survival exceeds 80%	
Live Plants:				5		

Access V2-4 12/13/2014



Access route live plants quantity 5 divided by planted April 2011 quantity 6 = 83%+ survival

**Vane 5 length 74 feet located inland shoreline SE of pump house off Meadow Way.
The following table data combines access V5-V7 route and Vane 5 status.**

Plant Type	Height	Vigor	Qty	Plant status Dec 2014 Planted Apr 2011 = 112 Vane 5 plant survival exceeds 80%	 <div>2014/12/13</div> <div>V5 Heel 12/13/2014</div>
Doug fir, Sitka spruce, Hemlock	7-8 ft	Good	16		
Doug fir, Sitka spruce, Hemlock	4-6 ft	Good	49		
Doug fir, Sitka spruce, Hemlock	2-3 ft	Good	13		
Alder	4-6 ft	Good	26		
Alder	2-3 ft	Good	19		
Live Plants:			123		
N 47° 06.487', W 121° 36.052' at shoreline vane stake. > 16 Foot OHW bank height.					



Vane 5 live plants quantity 123 divided by planted April 2011 quantity 112 exceeds 80%+ survival

Vane 6 length 70 feet located inland shoreline upstream of Vane 5 off Meadow Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Doug fir, Sitka spruce, Hemlock	7-8 ft	Good	8	Planted Apr 2011 = 106	
Doug fir, Sitka spruce, Hemlock	4-6 ft	Good	42	Vane 6 plant survival exceeds 80%	
Doug fir, Sitka spruce, Hemlock	2-3 ft	Good	35		
Alder	4-6 ft	Good	20		
Alder	2-3 ft	Good	24		
Live Plants:			129	Heel 12/13/2014	
N 47° 06.459', W 121° 36.048' at shoreline vane stake. > 16 Foot OHW bank height.					
				V6 Upstream 12/13/2014	



Vane 6 live plants quantity 129 divided by planted April 2011 quantity 106 exceeds 80%+ survival

Vane 7 length 66 feet located inland shoreline upstream of Vane 6 off Meadow Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Heel 12/13/2014
Doug fir, Sitka willow, Hemlock	7-8 ft	Good	3	Planted Apr 2011 = 100	
Doug fir, Sitka willow, Hemlock	4-6 ft	Good	32	Vane 7 plant survival exceeds 80%	
Doug fir, Sitka willow, Hemlock	2-3 ft	Good	39		
Alder	4-6 ft	Good	8		
Alder	2-3 ft	Good	14		
Live Plants:			96		
N 47° 06.435', W 121° 36.037' at shoreline vane stake. > 16 Foot OHW bank height.				 V7 Upstream 12/13/2014	



Vane 7 live plants quantity 96 divided by planted April 2011 quantity 100 = 96%+ survival

Vane 8 length 53 feet located inland shoreline downstream off Piney Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Heel 12/14/2014
Doug fir, Sitka spruce, Hemlock	7-8 ft	Good	8	Planted Apr 2011 = 66	
Doug fir, Sitka spruce, Hemlock	4-6 ft	Good	38	Vane 8 plant survival exceeds 80%	
Doug fir, Sitka spruce, Hemlock	2-3 ft	Good	21		
Live Plants:			67		
N 47° 06.381', W 121° 35.000' at shoreline vane stake. > 10 Foot OHW bank height.				 V8 Toe 12/14/2014	



Vane 8 live plants quantity 67 divided by planted April 2011 quantity 66 exceeds 80%+ survival

Vane 9 length 43 feet located inland shoreline upstream of vane 8 off Piney Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Heel 12/14/2014
Doug fir, Sitka spruce, Hemlock	7-8 ft	Good	12	Planted Apr 2011 = 66	
Doug fir, Sitka spruce, Hemlock	4-6 ft	Good	33	Vane 9 plant survival exceeds 80%	
Doug fir, Sitka spruce, Hemlock	2-3 ft	Good	19		
Live Plants:			64		
N 47° 06.369', W 121° 35.982' at shoreline vane stake. > 10 Foot OHW bank height.				 V9 Toe Downstream 12/14/2014	



Vane 9 live plants quantity 64 divided by planted April 2011 quantity 66 = 96% survival

Vane 10 length 50 feet located inland shoreline upstream of vane 9 off Piney Way.
Following data combines access V8-V14 route and Vane 10 status.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Heel 12/16/2014
Birch	7-8 ft	Fair	1	Planted Apr 2011 = 22	
Birch	4-6 ft	Fair	1	Vane 10 plant survival exceeds 80%	
Doug fir, Sitka spruce, Hemlock	4-6 ft	Good	3		
Doug fir, Sitka spruce, Hemlock	2-3 ft	Good	3		
Alder	4-6 ft	Good	12		
Alder	2-3 ft	Good	21		
Live Plants:			41		
N 47° 06.346', W 121° 35.971' at shoreline vane stake. 3 Foot OHW bank height.				 V10 Toe 12/16/2014	



Vane 10 live plants quantity 41 divided by planted April 2011 quantity 22 exceeds 80%+ survival

Vane 11 length 137 feet located inland shoreline upstream of vane 10 off Piney Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	 Heel 12/16/2014
Sitka willow	2-3 ft	Fair	2	Planted Apr 2011 = 55	
Birch	7-8 ft	Fair	5	Vane 11 plant survival exceeds 80%	
Birch	4-6 ft	Fair	10		
Doug fir, Sitka willow, Hemlock	4-6 ft	Good	3		
Doug fir, Sitka willow, Hemlock	2-3 ft	Good	15		
Alder	4-6 ft	Good	1		
Alder	2-3 ft	Good	9		
Live Plants:			45		
N 47° 06.332', W 121° 35.935' at shoreline vane stake. 1 to 2 Foot OHW bank height.				 V11 Toe 12/16/2014	



Vane 11 live plants quantity 45 divided by planted April 2011 quantity 55 = 81% survival

Vane 12 length 62 feet located inland shoreline upstream of vane 11 off Piney Way.

Plant Type	Height	Vigor	Qty	Plant status as of Dec 2014	 <p>2014/12/16</p> <p>Heel 12/16/2014</p>
Doug fir	4-6 ft	Good	2		
Doug fir	2-3 ft	Good	6	Planted Apr 2011 = 25	
Birch	7 ft	Good	1	Vane 12 plant survival exceeds 80%	
Birch	5-6 ft	Good	5		
Sitka willow	4-6 ft	Fair	2		
Sitka willow	2-3 ft	Fair	2		
Alder	2-3 ft	Good	4		
Live Plants:			22		
N 47° 06.305', W 121° 35.918' at shoreline vane stake.				 <p>2014/12/16</p> <p>V12 Toe12/16/2014</p>	
2 to 3 Foot OHW bank height.					

Vane 12 live plants quantity 22 divided by planted April 2011 quantity 25 = 88%+ survival



Vane 13 length 40 feet inland shoreline downstream next to vane 14 from Piney Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Birch	7-8 ft	Good	7	Planted Apr 2011 = 15	
Birch	4-6 ft	Good	5	Vane 13 plant survival exceeds 80%	
Doug fir	2-3 ft	Good	2		
Alder	2-3 ft	Good	1		
Live Plants:			15		Heel 12/14/2014
N 47° 06.319', W 121° 35.923' at shoreline vane stake. 3 Foot OHW bank height.					
					V13 Toe 12/14/2014

V13 Toe 12/14/2014

Vane 13 live plants quantity 15 divided by planted April 2011 quantity 15 = 100%+ survival

Vane 14 length 90 feet inland shoreline with vane 13 furthest upstream from Piney Way.

Plant Type	Height	Vigor	Qty	Plant status Dec 2014	
Sitka willow	4-6 ft	Fair	4	Planted Apr 2011 = 24	
Birch	10-12 ft	Good	8	Vane 14 plant survival exceeds 80%	
Birch	6-7 ft	Good	6		
Doug fir	4-6 ft	Good	3		
Alder	4-6 ft	Good	2		
Alder	2-3 ft	Good	5		
Live Plants:			28		
<p>N 47° 06.148', W 121° 35.395' at shoreline vane stake. Furthest upstream inland rock vane. At site main channel bends West to East.</p> <p>3 Foot OHW bank height.</p> <p>18 ft - 20 ft shoreline erosion since 2010. A vane toe rock exposed. One mature shoreline alder lost 2014 and another mature alder in upstream proximity leaning over channel.</p>					
					V14 Toe Stake Lost to Erosion 12/14/2014

Vane 14 live plants quantity 28 divided by planted April 2011 quantity 24 exceeds 80%+ survival

Vane sites and access routes totals:

April 2011 planted = 767	December 2014 live plants = 915, survival exceeds 80%
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