



MEMORANDUM

To: Crystal River Ranch Shoreline Project Team

From: Larry Dominguez, KPFF Environmental Manager & Bailey Thorniley, EIT

Date: September 9, 2018

Subject: 2018 Vane Assessment Summary

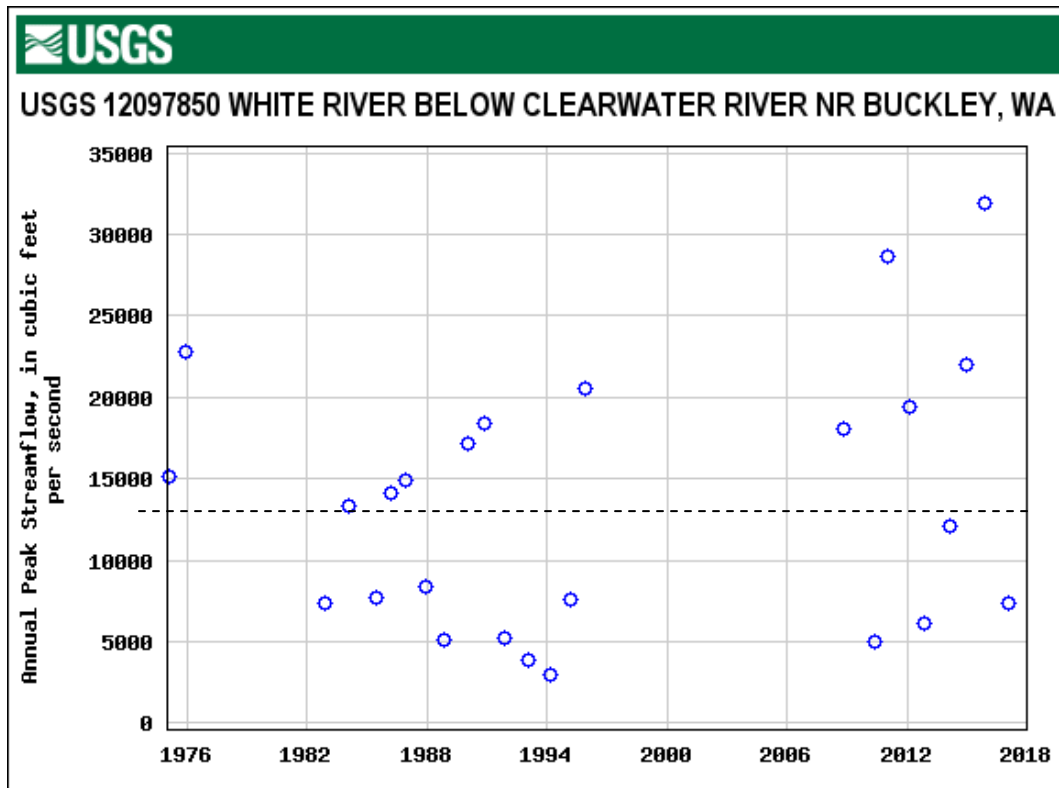
On Wednesday August 22, 2018 KPFF conducted the annual shoreline erosion survey for Vanes 1-14 of Crystal River Ranch. We located all tree tags except for ones that were previously noted as gone or determined to be gone this date due to bank erosion. The field assessment resulted in the following summary:

- Bank erosion is occurring even though the peak flood event this year was below average.
- The assessment required transferring tags from disease or insect-affected trees to healthy trees for longer term use as markers. Details of those tags are at the end of the memo and noted in the marker spreadsheet (attached).
- Where vanes are being exposed, the larger material is predominantly remaining near the vane but some may be transported since those particular sites are experiencing active toe erosion.
- Some of the trees throughout the area are dying due to drought and/or disease. Future surveys should note the health of trees and make changes to markers should some trees be at risk to falling prior to loss from erosion.

The following table is a summary of changes in erosion and vane qualitative ratings since the May 2017 Assessment:

Vane No.	Maximum Erosion	Rock Vane Qualitative Rating change		
		Function	Habitat Risk	Erosion Trend
1	0.0	none	none	none
2	2.0 ft	none	none	none
3	1.0 ft	none	none	none
4	0.5 ft	none	none	none
5	1.5 ft	none	none	none
6	0.0	none	none	none
7	0.0	none	none	none
8	2.5 ft	none	none	none
9	0.0	none	none	none
10	0.0	none	none	none
11	4.5 ft	none	none	none
12	4.0 ft	none	none	none
13	0.0	none	none	none
14	0.0	none	none	none

2017 peak flow was 7,350 cubic feet per second (cfs). Thus 2017 was a below average year (Average peak flows for period of record is 13,400 cfs).



General Tree Marker observations

- Tree marker TM # 403 is now in place of # 402.
- TM # 406 correctly retagged to cottonwood tree.
- Vane 2, there is a tree tagged by a yellow ribbon that needs a TM. The location is about 15 ½ feet north of TM #421.
- TM # 415 was placed about 20 ft west of TM # 459. It is a new TM. It was located on a tree that will be lost very soon.
- TM # 461 was moved to adjacent tree to replace dying tree. New measurement taken.
- TM # 427 moved from fallen dead tree to new tree in adjacent location.

General Site Summary

Where erosion has curtailed, vegetation is establishing at the toe of the bank. High bank areas however, such as Vane 2 and 3 have heavily undercut banks and should expect very high erosion rates in events 20 cfs or greater since there is limited rooted vegetation.

The Shoreline team explored the possibility of acquiring drone-based video of the assessment reach for another form of communication. In moving forward with larger scale and long-term solutions to protecting the community properties and infrastructure, this type of imagery receives positive results as a demonstration while explaining resource issues to the public at large. The air quality conditions were poor and the team determined it best to revisit that this fall or early winter for clear imagery.

The imagery from the drone may also be utilized for surveying should the shoreline team be interested in a bridge widening project downstream to help alleviate the lateral erosion in the Crystal River Ranch reach. The team will consider this KPFF service in the future.

Key imagery



Vane 4 has a section of the vane exposed (larger angular rocks).



Vane 6 establishing vegetation at toe since flow has been less frequent at the toe over the past few years.



Vane 11 remains one of the highest eroding banks. Here note the large boulders that comprise the now-exposed vane. Toe erosion is contributing to large overhanging banks.

Tree Marker Summary

Vane	Tree/mark	Description	Distance to Nearest Undisturbed Top of bank (ft)			
			Nov 1, 2013	Sept 24, 2016	May 16, 2017	August 21, 2018
1	401	fir	7	7.0	7.0	7.0
1	402		0.1	0.1	0.1	DNE
1	403	cedar,				0
1	406	cottonwood	13	13.0	12.5	12.5
1	405	lg central tree	93.5	93.5	93.5	93
1	407	small bench	3.0	3.0	3.0	3
1	408	snag	0.1	0.1	0.1	DNE
1	toe peg		6.5	6.5	6.5	
2	459	dwnstrm of vane 2, alder cluster	DNE	0.1	0.1	0
2	409	gone	3.5	DNE	DNE	DNE
2	410	gone	11.5	DNE	DNE	DNE
2	411	gone	4	DNE	DNE	DNE
2	###					7
2	412	cottonwood	19.5	19.5	0.0	0
2	413	gone	3	DNE	DNE	DNE
2	414	cottonwood	50.5	45.5	45.2	-
2	415		6	0.1	0.1	0
2	415 (new/18)		-	-	-	13.5
2	416		11	4.5	4.5	DNE
2	toe peg	gone	2.0	0.1	DNE	DNE
2	460		DNE	5.7	5.7	3.8
2	heel peg	heel peg	DNE	DNE	58.0	
3	461	grand fir; in small grove		25.2	25.2	25.2
	461 (NEW/18)	adjacent fir	-	-	-	26.1
3	417	gone	5	5.0	DNE	DNE
3	418	gone	7.85	7.85	DNE	DNE
3	419	gone	5	5.0	DNE	DNE
3	420	gone	5.75	5.75	DNE	DNE
3	toe peg	gone	1.5	DNE	DNE	DNE
3	heel peg		DNE	98.0	61.5	60.3
3	462		DNE	22.0	21.0	20.3
3	463		DNE	19.0	19.0	18.3
4	421	ctnwd	27.3	4.0	4.0	3.5
4	422	gone	7.6	DNE	DNE	DNE
4	423	gone	6.5	DNE	DNE	DNE
4	424	fir	27	22.6	22.0	20.5
4	425	ctnwd	4.5	4.5	DNE	DNE
4	426	fir	8	8.0	8.0	8
4	464		DNE	1.0	1.0	1
4	470				11.5	
4	toe peg		7.5	7.5	7.5	7.5
4	heel peg		DNE	DNE	46.5	
5	427		7.5	6.0	6.0	6
	427 (NEW/18)					7
5	428		10.5	0.1	DNE	DNE
5	429		18	18	15.5	17
5	430		80.1	7.0	6.6	6
5	465	cedar, 10" dbh	DNE	24.6	23.5	23.3
5	toe peg		7.0	6.0		6
5	485		DNE	DNE	21	
6	431		3.75	3.0	0.1	1.5
6	432		8.45	8.45	5.5	5.5
6	433		13.4	13.4	9.2	13
6	toe peg		6	6	3.3	-
6	heel peg		DNE	DNE	6.2	
7	434		30.0	22.3	20.2	22
7	435	gray pvc stake by new, small tree	9.8	9.8	8.0	9.8
7	436	Nahume property, fir at fenceline	27.0	27.0	27.0	27
7	toe peg		0.1	0.1	0.1	DNE
7	heel peg		DNE	DNE	43	
8	437		6.5	6.5	4.8	4.5
8	438		13.2	13	12.5	10
8	439		40.5	36	36	36
8	440		6.75	6.75	6.75	6.75
8	toe peg			7.6	7.6	7.60
8	heel peg		DNE	DNE	54.5	

9	441		2	2	0.1	0
9	442		5	5	5	5
9	443		54	41	38.2	40
9	toe peg		10.45	10.45	9.7	10.3
10	444		20.25	20.25	20.2	20
10	445		2	0.1	0.1	0
10	446		3.5	3.5	3.5	-
10	toe peg		8	8	5.5	6.5
10	heel peg		DNE	DNE	51.5	
11	447	alder	6.5	0.1	DNE	DNE
11	448	gone	14.65	0.1	DNE	DNE
11	toe peg		12	1.0	DNE	DNE
11	466	alder		11.7	8.2	4.20
11	467	cottonwood 18"		19.0	16	11.50
11	471				13.5	12.00
12	449	gone	4.5	0.10	DNE	DNE
12	450	stump	4.3	1.0	DNE	1.00
12	451		14	14	10.5	14
12	472		DNE	DNE	22.0	22
12	toe peg		0.1	0.1	DNE	DNE
12	heel peg				37.3	33.3
13	452	alder	36	36	33.0	36
13	453	alder	4.4	4.4	4.4	4.4
13	454	common to vane 14	0.1	0.1	0.1	0
13	455		37.8	37.8	36	37.8
13	toe peg		5.55	5.55	4.0	5.55
13	heel peg		DNE	DNE	44.5	
14	454	common to vane 13	0.1	0.1	0.1	0
14	456	gone	0.1	0.1	DNE	0
14	457		8.15	4.0	3.0	4
14	458		26.5	16.51	16.5	16.5
14	468	large pistol-butt cedar		52.0	48	52
14	469	cottonwood upstream	DNE	11	DNE	11
14	473	large fir	DNE	DNE	31	
14	toe peg	gone	4	DNE	DNE	DNE

Rock Vane Qualitative Vane Function, Habitat Impact, and Bank Erosion Risk RatingsTrend

Developed by EcoAssets for a qualitative assessment and long-term monitoring of vane performance on the Crystal River Ranch reach of the White River, Pierce County, WA.

[illegible][illegible]