

Land and Water Resources Consultants

June 2, 2016

To: Crystal River Ranch Executive BoardFrom: Lawrence Dominguez, Owner, Sr. EcologistRE: River Shoreline Reconnaissance, May 7, 2016

Summary

Crystal River Ranch (CRR) continues to invest in long-term monitoring and management of shoreline stability to ensure community property and wellhead protection. During 2012-2104 CRR desired to create baseline information for long-term monitoring of rock vane performance as a means to track the locations and rate of natural and vane-associated erosion in the community property project reach.

On May 7, 2016 I was accompanied by Wendy Scholl of Crystal River Ranch (CRR) to provide a reconnaissance of the rock vane areas that had suspected occurrence of erosion during winter 2015-2016. Due to past winter high flow that also recruited a high amount of sediment in some places, CRR determined that it would be helpful to have me re-visit the shoreline assessment area to verify erosion, evaluate the ability to locate previously-placed tree measurement tags, and make recommendations about a thorough replicate survey at a later date. Topics that were brought to my attention or that I had inquired about based on my observations included:

- Extensive areas of lateral erosion and portions of some rock vanes which are now riverine exposed. Need to address short term tasks and long-term management of rock vanes
- Determine what information could be utilized regarding the existing CRR hazard mitigation plan
- Existing tree cabling
- Recognition of a need this 2016 year for updating the rock vane measurement surveys, describing trends and facilitate that information into comprehensive shoreline planning.

• Recommended actions for support of comprehensive shoreline planning and management

Verification of lateral erosion and rock vane exposure

| | Est. maximum estimated | | Est. maximum estimated |
|----------|---|----------|------------------------|
| Vane No. | erosion (ft.)/note | Vane No. | erosion (ft.) |
| | | | |
| 1 | Did not visit | 8 | 2 |
| 2 | 7 | 9 | 2 |
| 3 | 8, all markers gone | 10 | 3.5 |
| 4 | 27 | 11 | 8.5 |
| 5 | Tree cabling, high bank, main channel on opposite shoreline | 12 | 4.5 |
| 6 | High bank, main channel on opposite shoreline | 13 | 5 |
| 7 | High bank, main channel on opposite shoreline | 14 | 20 |

Several vanes experienced varying levels of erosion

Cables used to anchor trees on bank and retain fallen trees

Near rock vane 5, some of the cables on trees should be evaluated for removal this year. This removal should be done by a professional in the timber industry. The cables are under a tremendous tightness posing a potential safety hazard. In other instances the cables are girdling the base of anchor trees which may be killing them. In at least one instance, the orientation of the tree that is cabled and along the bank may be contributing to erosion more than helping to stabilize the bank. A complete evaluation of the strategy should be conducted to determine if action is necessary.

Long term monitoring of rock vanes

There continues to be erosion in some of the reaches. The loss of metal measurement tags necessitates establishing replacement tags and the installation of more permanent heel and toe stakes for long-term reference. At minimum new identification vane stakes in a mid-vane location be established at active erosion sites. The approach will remain as easy-to follow methods so that CRR community members can replicate.

The observed vegetation establishment success occurring at the Knoll property should be considered as an example of how additional intensive planting along the bank could be established at sites along the rock vane reaches.

Comprehensive Long-term planning, Shoreline Planning and Hazard Mitigation

Updating the information in a more formal erosion report will provide data tracking uniformity and could help to better define the erosion hazard risk. Such documentation may help attain future funding for planning and action implementation. I am unaware of the contents approved in the CRR Hazard Mitigation Plan but having such a plan is required to pursue funding assistance to help protect the safety and economic interests of CRR. A hazard mitigation grant project application must include information on past damages and timely captured data point hazard data. General examples of potential hazard mitigation plan grant submittal(s) include water system seismic retrofitting, flood prevention, environmental adverse impact, etc. FEMA grant funding requires a 12.5% CRR match. These type ongoing assessments are often considered as viable match requirements.

Our cursory findings of this short visit magnify the value and foresight CRR had in deciding to establish erosion baseline and a means to replicate shoreline surveys. I recommend that the two day formal survey conducted in 2012 be repeated summer of 2016 to document this past winter's erosion. This is the Rock Vane Qualitative Function, Habitat Impact, and Bank Erosion Ratings Trend surveys. They would include photo recording, establishment of new metal measurement tags where ones have been lost plus recommendations on material and locations for new toe / heel identification stakes.

Wendy Scholl is suggesting at least two more CRR property owners become interested and commit to accomplishing on-going CRR shoreline management tasks. At the next shoreline field

survey (summer 2016, two days) I am willing to explain and convey as much knowledge possible to assist in accomplishing this. The project has always been to develop methods that are repeatable and viable for property owners to conduct. I am willing to make myself available at an upcoming Board meeting to provide an overview of recommended activities and long-term planning considerations.