BIOMARK PROJECTS

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SEDIMENT MOVEMENT

The San Juan River on southern Vancouver Island, British Columbia, has seen decades of forest harvesting. The historical logging practices which were employed from the early 1900's to the 1980s resulted in damage to the riparian corridor of the river as well as the hillslopes. Sediment delivery to the main channel from historic hillslope failures has dramatically altered the sediment budget of the river on the floodplain. Sediment delivery combined with weakened riparian structure has led to continued degradation of salmon habitat.

Researchers are using a custom designed Biomark antenna system to track sediment movement in San Juan River. The data is being used to study geomorphic change, sediment dynamics and impacts to fish habitat.

Project Summary

Application description:
The current antenna assembly consists of an IS1001 board with BLE logger attached to a cable antenna. The system is controlled using a Microsoft Surface via Bluetooth. The cable antenna is attached to a 15' x 5' frame constructed from 3/4" schedule 40 PVC suspended from a frame pack on adjustable ropes. HPR Plus readers with BP Plus antennas are used for localized searching.

Species/object:
Rocks are collected from the river, drilled using sintered diamond drill bits and PIT tagged. Tags are placed in the rocks and held in place using cement-grade epoxy. Rocks are painted using fish friendly paint. The PIT tagged rocks are placed on the river bed in the fall for mobilization during winter floods.

Location:
San Juan River, British Columbia, Canada

Products Used:
IS1001 controller with Bluetooth board and Cable Antenna and HPR Plus with BP Plus Antenna.

Project Partners:
Pacheedaht First Nation, Province of British Columbia, Fisheries and Oceans Canada, Forest Industry

Funding Organizations:
BC Ministry of FLNRORD Research Program, Recreational Fisheries Conservation Partnership Program (Fisheries and Oceans Canada)

For the past 5 years we have been collecting detailed morphological data on San Juan River using LIDAR, Drone Imagery DEMs, time lapse cameras, ADCP bathymetry, RTK GPS surveys, Total Station surveys and PIT tagged rock release and recovery. The PIT tagged rock search relies on a custom built Biomark antenna array mounted on a backpack. The annual search lasts about 3 weeks every summer. The antenna is run along linear transects until a rock is detected. The Location is flagged and the antenna is turned 90 degrees and the location is scanned and flagged again. Using this method we can triangulate the location of the rock to a small area (< 1 m2) for excavation. The HPR plus is then used to locate the rock more accurately prior to, and during excavation

We went through several iterations of our larger Biomark (cable) antenna set up. It started life at an unwieldy 80 lb. of 3" PVC with the cable antenna inside the pipe. This version never went beyond the prototype (Mark I photo). The Mark II (photo), which we used during the first year of rock searching was a two person behemoth. The system required two backpacks, one with a rugged field laptop, to control the antenna, a large battery pack and electronics case containing the IS1001. A second person carried a 1" pvc frame mounted with the cable antenna. After a conversation with Biomark,

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Our Biomark antenna has a better read range than the best we could find reported in the literature. The results of our rock search in the San Juan River have achieved an average tag recovery rate of about 75%. This significantly exceeds any other reported in the literature for rivers of similar size. The closest comparable rivers reported recovery rates of about 45%. We have gone so far as to proclaim an unofficial world record in recovery rate for tracers on large rivers.

Additional Information/Links:
Master's Thesis by Ryan McQueen at UWO under Dr. Peter Ashmore : https://ir.lib.uwo.ca/etd/6242/

Photo 1: Rocks which have been drilled, tagged and painted ready for deployment.
Photo 2: Mark II in action on site in the San Juan showing the flexibility of the cable antenna setup for searching sloped gravel bar areas.
Photo 3: The Mark III in action.
Photo 4: The Mark III.
Photo 5: The Read range paper.