**Project Snapshot:**

**Video Debris Observation System**

**Project Summary**

This project complements the Alaska Hydrokinetic Energy Research Center’s (AHERC) ongoing research on understanding and mitigating the effects of debris on river energy converters at the Tanana River Test Site (TRTS). The latest version of the Video Debri Mitigation Observation System (VDOS) is a video data collection tool capable of gathering information on the frequency and characteristics of river- or ocean-borne debris at road-accessible and remote sites. The second generation VDOS, tested in summer 2014 at the TRTS, uses improved photo capture technology and a power supply that allows for autonomous monitoring of river or ocean debris.

**Project Need**

The Alaska Hydrokinetic Research Center conducts research on debris in rivers with the goal of developing mitigation strategies and technologies that enable the implementation of hydrokinetic energy in Alaska and other developing economies. To this end, a second-generation video observation and data collection system was designed and then deployed in the field at the TRTS in summer 2014. The improved VDOS system monitors river debris flow and the performance of debris mitigation devices by providing high-resolution photos at a rate of one photo per second.

**Project Highlights**

The goal of the VDOS project is to capture images of high spatial and temporal resolution from both on-shore and on-barge systems in order to develop statistical models for debris occurrence (for example, using debris size and frequency distributions). In addition, the barge-mounted system will supply detailed documentation of interactions between debris and debris mitigation technologies.
The current VDOS consists of an on-shore base station and a vessel-mounted camera and communication system (vessel mounted system to be deployed summer 2015).

The onshore system consists of a high-resolution camera, a network-attached storage system, a web relay for system monitoring, and a wireless router for communication between the shore and the vessel-based system. Data is duplicated to a RAID array to minimize loss in case of system failure.

2014 saw the addition of an automated power system to the VDOS. The new power system eliminates the need to manually start a generator to charge the system's battery bank and considerably increases the resiliency and portability of the system. The automated power system was enabled by the use of a programmable logic controller (PLC) which monitors battery voltage. If the PLC senses low battery voltage, an auto start generator is engaged to charge the batteries. When the battery bank is fully charged, the PLC shuts the generator down, and switches to monitoring battery voltage. The PLC and auto-start generator allow the system to run for extended periods of time in the field without the need of constant user intervention.

The second generation VDOS was successfully deployed at the Tanana River Test Site for a portion of the 2014 field season. The system collected high quality photos that will be used to analyze debris flow and frequency. The ultimate goal of the VDOS is to collect and map debris data to help determine the best river or ocean locations to install hydrokinetic energy generators. The VDOS design and packaging allows for the system to be transported to remote projects sites and installed easily without the need for external power.

Future Work

Future work on the VDOS will include the installation of the on-vessel camera in summer 2015. The on-vessel camera will take close-up photos of the hydrokinetic turbine test platform and AHERC's debris diversion system and send them wirelessly to the onshore system for storage. The use of both onshore and on-vessel systems will provide a large amount of quality data to accurately understand debris and its effects on in river infrastructure.

Project Funding Partners
Alaska Energy Authority

Project Research Partners
Alaska Power and Telephone (AP&T)