Incorporation of Solar Power Generation and Wireless Networking Technologies into Sonar Operations on the Chandalar River

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Project Proponents: Jeff Melegari, USFWS-Fairbanks Fish and Wildlife Field Office**,** 101 12th Avenue, Room 110, Fairbanks, Alaska, 99701, jeff_melegari@fws.gov

1. Introduction:

Objectives:

1.) Improve data collection and data integrity for the DIDSON sonar operations on the Chandalar River.

2.) Reduce fuel consumption and associated costs at the Chandalar River project.

2. Study Area:

Some logistics and preparation began in early June. Operations occurred from August 8 through Sept 26 at the Chandalar River, approximately 21.5 river kilometers upstream of its confluence with the Yukon River.

3. Methods:

A solar power system, and wireless network was installed with the DIDSON unit on the left bank of the river. Additionally a wireless network was attempted to be installed on the right bank. The solar charging system was comprised of four 130 w solar panels with a ground mount array frame, A battery bank made up of 4 6 volt 110 AH batteries wired in series, charge controller, sine wave inverter, battery meter and necessary cabling.

Each wireless network included two D-Link® DWL-2100AP wireless access points, one connected to the DIDSON, and the other, connected to the receiving computer. A D-Link® ANT24-1800 outdoor directional panel antenna was attached to each access point using an outdoor low loss RF cable. All DIDSON control and analysis computers were housed in a single weatherport allowing for more efficient operations.

4. Results:

Sonar operations began on August 8, with the solar power system in operation. The system worked well, and supplied enough power to keep the sonar operating without any generator use until the second week of September. As the length of daylight lessened in September, the output of the solar power system dropped accordingly and had to be supplemented with a generator for 3-5 hours overnight.

Wireless networks were originally set up on both banks. However, we were unable to operate both networks at the same time. Presumably this was due to the close proximity of the antennae and interference with each other. Either network would work effectively by itself but when both were attempted to be operated at the same time they would experience extremely poor performance and would often loose connections, despite being set to different channels. Therefore the wireless connection was only used on the left bank. Once set up the left bank wireless worked well with only occasional interruptions to communications

5. Discussion:

Both the solar power system, and the wireless network on the left bank performed well. Incorporation of solar power and the wireless network increased the efficiency of the project. We estimated that the use of the solar power system saved approximately 150-175 gallons of fuel and the associated costs and effort of transporting that fuel to a remote site. In addition to the fuel and related costs savings, the reduced need for boat trips back and forth across the river will reduce wear on boats as well as reduce potential boating safety concerns. Finally the solar and wireless presented the ability locate all data gathering and analysis in one place, which not only increased efficiency, but also facilitated training of technicians, improved consistency of data collection and analysis, and ensured consistent and continuous operation of the DIDSONs.