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KYLE GRAHAM Digitally signed by KYLE GRAHAM Date: 2019.05.16 15:52:57 -08'00'

Cook Inletkeeper
3734 Ben Walters Lane
Homer, Alaska 99603

p. 907.235.4068
f. 907.235.4069
www.inletkeeper.org

Final Performance Report for USFWS Agreement F16AC01124

Date: March 29, 2019
Report submitted by: Sue Mauger, Science Director, Cook Inletkeeper
Reporting Period: July 1, 2018 – December 31, 2018
Due Date: March 31, 2019
Project Title: Stream Temperature and Stream Stage Monitoring Project

Project Background

This project will result in a 10-year assessment of temperature trends in ten salmon streams on the Kenai Peninsula, which the Kenai Peninsula Fish Habitat Partnership's Freshwater Conservation Action Plan has identified as conservation targets vulnerable to a warmer climate. In addition, we propose to develop a low-cost, digital camera-based stream stage monitoring system, which will involve collecting image-based stage heights by focusing a camera on an in-stream staff plate and generating a time series of water levels. Data will be delivered in a variety of ways, including using citizen observers and real-time, web-based connectivity, to meet different users' specific needs. We will develop a strategic plan to facilitate water level data collection on Kenai Peninsula streams.

Project Objectives

Our objectives are to 1) develop long-term stream temperature datasets to track trends on 10 salmon streams on the Kenai Peninsula; 2) develop a low cost, digital camera based stream stage monitoring system; and 3) develop a strategic plan to facilitate water level data collection on Kenai Peninsula streams.

Project Activities for the reporting period

During this period, Cook Inletkeeper and project partners conducted the following activities:

- Compiled 15-year temperature datasets (2002–2017) on 3 streams and 10-year datasets (2008–2017) on 7 streams on the Kenai Peninsula.
- Archived datasets on the Knowledge Network for Biocomplexity (KNB), which is an online, international repository intended to facilitate ecological and environmental research. These data were archived in cooperation with the State of Alaska Salmon and People (SASAP) project.
- Incorporated temperature data from 9 sites into an analysis about freshwater habitat suitability for Cook Inlet Chinook salmon. (Bishop Creek was the one stream not included

because it is not a Chinook system.) Through this analysis we modeled summer stream temperatures (May–August) from 1980–2016 and found that summer temperatures in these 9 Kenai Peninsula salmon streams increased by 0.23 – 0.38°C/decade. We found that maximum weekly stream temperatures above 15°C negatively affected productivity during the juvenile salmon growth period, but that mean monthly precipitation during summer months was positively associated with Chinook productivity. This suggests that, during years of low snowpack, high summer precipitation can ameliorate the impacts of warming temperatures on salmon.

- Installed an AT&T compatible camera and security box on Stariski Creek to assist the Alaska Dept. of Fish and Game in their stream gauging efforts. The camera had to be sent back to the manufacturer twice because of a faulty antenna so the on-site installation did not happen until October 9, 2018.
- Captured hourly images of Stariski Creek's staff plate, which can be seen through an online portal as well as stored on a SIM card. Although these images are not clear enough to read the scale on the staff plate, these images informed timing of ADF&G field visits and provided a quality assurance measure for the pressure transducer data. ADF&G has found this set up valuable and is funding continued operation of the online portal in 2019.
- Held a camera team teleconference to discuss project accomplishments and plan for future monitoring and collaboration on December 17, 2018. We concluded that a) it is possible to configure a camera-staff plate set up which allows for real-time automation of water levels; b) Spartan GoCam (ATTXB with AT&T data plan) camera met our needs for connectivity, memory, and power, c) reality doesn't offer the perfect on-site camera placement very often, and d) a picture tells us a lot and has multiple end uses.

Project Accomplishments during the reporting period

Temperature data compiled through this project are:

1. available to the public and other researchers to download: https://knb.ecoinformatics.org/view/doi:10.5063/F18W3BKS
   And can be referenced as:
   Cook Inletkeeper. 2018. In-situ stream temperature monitoring, Cook Inlet, Alaska, 2002-2017. Knowledge Network for Biocomplexity. doi:10.5063/F18W3BKS.
2. incorporated into an analysis to understand the influence of water temperature and stream flow on Chinook salmon productivity.
   Schoen, E., R. Shaftel, C. Cunningham, L. Jones, S. Mauger, D. Rinella, and A. St. Saviour. 2018. Freshwater drivers of Chinook salmon in Cook Inlet, Alaska. Prepared for the Pacific Marine States Fisheries Commission. Alaska Center for Conservation Science, Anchorage, AK. (Manuscript in preparation.)

Temperature monitoring partners will continue to collect temperature data at 8 of the 10 sites

for as long as the temperature loggers purchased through this project have battery power.

Accomplishments from the camera-based stream stage monitoring work include:

1. Successful inclusion of 4 UAA students in the project and helping them build skills in machine learning, image processing, coding and providing a real-world application for their work.
2. Identified an off-the-shelf, low cost (<$500) camera that is suitable for this type of monitoring by partnering with a local camera expert.
3. Following the identification of a suitable camera and after evaluating the UAA students work flow and code, National Weather Service's River Forecast Center staff was able to develop in-house software for an analysis to 'pick' the water line from images and convert them to stage. The temporary camera set up in Whittier Harbor during the last reporting period facilitated this achievement.
4. The installation of the camera on Stariski Creek has proven valuable to resource managers as they complete their application for a reservation of water for the protection of fish.
5. The camera team and other local partners have identified streams for future stream gage monitoring to support the protection and maintenance of fish habitat on the Kenai Peninsula.

Brief Budget Summary for the reporting period

Cook Inletkeeper has used the Department of the Interior's Automated Standard Application Payments (ASAP) process to draw down funds totaling $7,285 this reporting period. Please see the attached SF425 and Expenditure Summary Report for details about how these funds were spent to achieve project objectives. In addition, Cook Inletkeeper and project partners have contributed $8,831 this reporting period in match dollars through non-federal grant funds and in-kind support.

Expenditure Summary Report

Stream Temperature and Stream Stage Monitoring Project
(F16AC01124)

Grant Award	$32,075
Previous reporting periods	$24,790
Draw (8/27/2018)	$ 5,000
Draw (11/27/2018)	$ 2,285
Balance	$ 0

This report summarizes drawdowns from August 27 and November 27, 2018, which covered expenses incurred from July 1, 2018 – December 31, 2018.

Salaries	
Science Director (140 hours @ $39.25)	$ 5,495.00
Supplies	
ATT data plan (2GB of data for 3 months, purchased 7/9/18)	$ 25.00
ATT data plan (2GB of data for 3 months, purchased 10/7/18)	$ 25.00
Spartan Camera web delivery fee ($4/month)	20.00
Camera repair shipping	13.05
Spartan No Glow camera, box, cable lock	451.85
Indirect	$ 1,255.10
Federally Approved Indirect rate 32.35% ($6,029.9 * .3235 = $1,950.67; requesting $1,255.10)	
Total	$ 7,285.00

Explanation of Expenditures as related to Grant Objectives:

Salaries: Science Director's time related to Objective 1-3 activities

Supplies: Objective 2 activities