Aquatic and Riparian Effectiveness Monitoring Program

Stream and Air Temperature Monitoring Report

2015 Field Season

Heidi Andersen

USDA Forest Service Pacific Northwest Regional Office
Bureau of Land Management Oregon State Office
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Introduction

The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) began a partnership in 2011 with the US Forest Service (USFS) Pacific Northwest Regional Office, Bureau of Land Management (BLM) Oregon State Office, and US Geologic Survey (USGS) Forest Rangeland and Ecosystem Science Center to monitor year-round instream and air temperatures in watersheds throughout the Northwest Forest Plan Area in Oregon and Washington. The purpose of this ongoing partnership is to provide baseline year round air and stream temperature data to climate scientists, aquatic ecologists, fish biologists and hydrologists to help determine the sensitivity of stream temperature to climate change.

AREMP temperature data is shared with the USFS Rocky Mountain Research Station as part of the NorWeST regional stream temperature project (Isaak et al 2011). The NorWeST project gathers existing full year stream temperature data from federal government, state, tribal and private sources from across the Northwest to develop spatially explicit stream network models for climate change scenarios. Outputs from these models are available on the NorWeST website for use by biologists, hydrologists, and researchers to better understand thermal impacts on aquatic species and to help prioritize conservation efforts (http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html).

Deployment and Downloading Methods

AREMP field crews have calibrated, deployed and downloaded instream and air temperature sensors for the last five field seasons (2011-2015). Crews placed sensors instream, directly next to the stream (stream-side) and at an upslope location 300 ft. to 700 ft. (91 m to 214 m) in elevation above the stream-side sensor. Solar radiation shields were used for instream and air temperature monitoring stations to minimize the impact of direct sunlight on temperature data.
In 2015, hydrologists and fish biologists from local BLM, USFS and National Park Service (NPS) units assisted with checking and downloading temperature sensors. Local units download sensors in the spring and fall. The spring check ensured sensors were in place to log summer temperatures and the fall check ensured summer maximum temperatures were recorded and sensors were secured before high flows.

Table 1—Number of watersheds instrumented with instream water temperature, and stream-side and upslope air temperature sensors by state as of December 2015.

	Instream (water)	Stream-side (air)	Upslope (air)
Oregon	121	112	103
Washington	57	53	48
Total	178	165	151

Temperature Sensor Locations

Temperature sensors were deployed in the Northwest Forest Plan area on USFS, BLM, and NPS Lands in Oregon and Washington (fig. 1 and table 1). In 2015, AREMP crews visited 75 watersheds to download and deploy sensors and specialists from local units visited 72 watersheds. A total of 92 unique watersheds were visited since AREMP crews opportunistically checked thermographs in watersheds if they were traveling in the area. During these visits any sensors lost over the winter were replaced. Approximately 33% of the instream temperature sensors were lost over the winter due to high flows, being tampered with or destroyed by people, or just simply not relocated because different technicians deployed the devices.

Stream side air temperature thermographs were monitored in 68 watersheds and upslope air temperature thermographs in 42 watersheds in Oregon and Washington. Air temperature sensors had lower loss rates; 8% for both stream-side and upslope air sensors.

Improvements Made in 2015

AREMP staff made the following improvements to this effort in 2015:

- Modified our procedures to use a resource grade GPS unit for better location accuracy.
- Created a Forest Service SharePoint database for deployment activities, providing a stable, secure, cloud-based multi-user solution that also synchronizes with MS Access for reporting and analysis. The site can be searched from a Forest Service compute to find thermograph deployment information and locations (https://ems-team.usda.gov/sites/fs-cio-AREMP/logger-track/_layouts/15/start.aspx#/SitePages/Home.aspx).
- Continued to work with local Forest Service and BLM personnel for assistance with downloading thermographs. Specialists from three BLM Districts, seven National Forests and one National Park helped download thermographs during the 2015 field season.

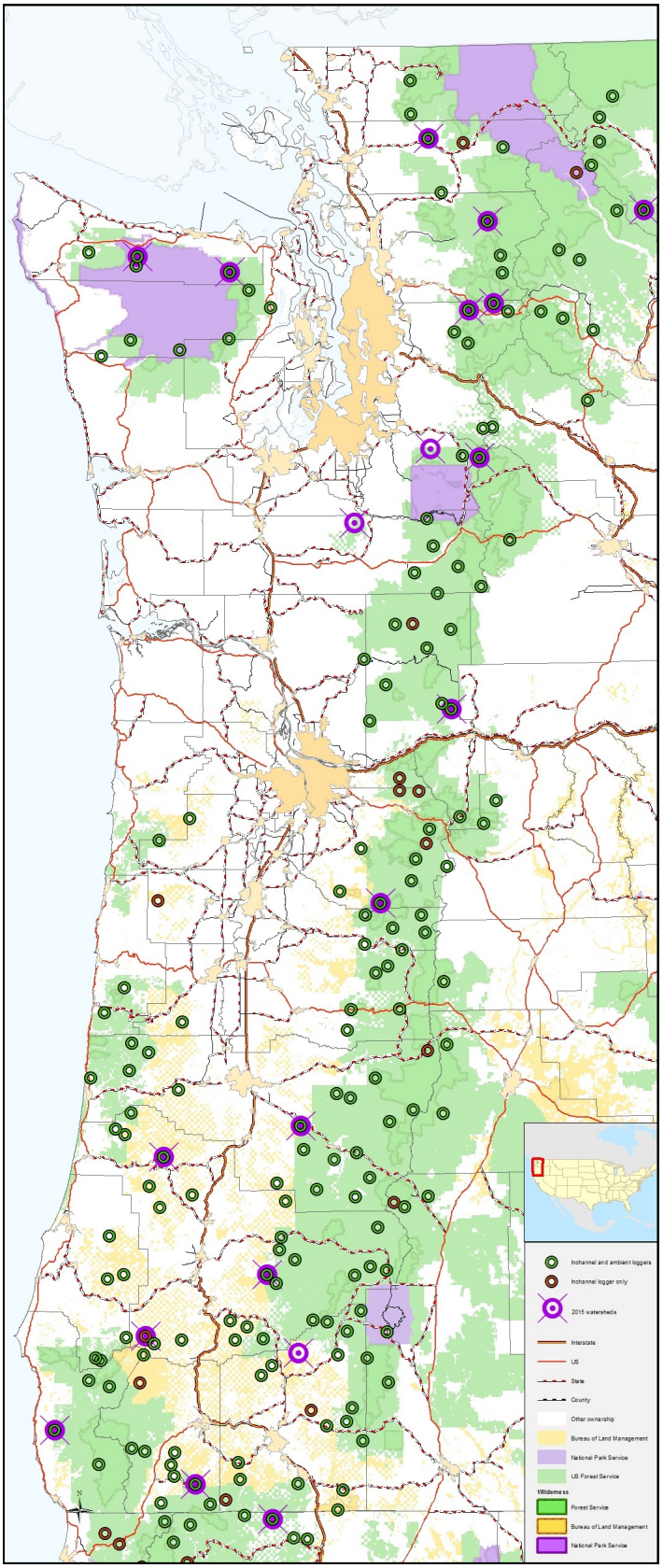

Figure 1. Location of instream and air temperature sensors placed by AREMP in the Northwest Forest Plan area of Oregon and Washington. The purple bull's eye represents watersheds surveyed for stream condition by AREMP in 2015. The green circle designates AREMP watersheds with a stream-side and upslope air sensor. The red circle depicts AREMP watersheds with an instream sensor.

Lessons Learned and Future Considerations

This project is now in its fifth year of field implementation. AREMP has been fortunate to have the same seasonal employee on our temperature monitoring crew for four seasons deploying and downloading thermographs. It will be essential to have accurate GPS locations for each thermograph so that other personnel will be able to find these devices in the future. Since crew consistency is very important for finding thermographs, AREMP office staff will need to come up with a succession plan in the event we need to hire a new crew leader. We have had great success with local units assisting with the care and maintenance of these thermographs. However, consistency is also an issue with local units as folks retire or move on to new positions.

During the 2016 field season we will be replacing thermographs that were originally deployed during the 2011 field season. Expected battery life for these devices in the field is 5 years. However, there is no way to predict when the battery will stop working other than by date since initial deployment. Once the battery dies, a new device needs to be purchased and deployed. Since the time between downloading is at least one year and often two years having a reliable way to determine end of battery life would be very useful.

We will have a field crew of two people downloading thermographs during the 2016 field season. One thing we are focusing on this season is to prevent our field crew from downloading devices that local units have taken on stewardship of. If our AREMP crew does opportunistically download a device because they are near a watershed, we will contact the local unit so that efforts are not duplicated.

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Contact Information

Heidi Andersen (heidivandersen@fs.fed.us), Fish Biologist

Phone: (541) 750-7067

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