
Aquatic and Riparian Effectiveness Monitoring Program

Stream and Air Temperature Monitoring Report

2016 Field Season

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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.

Deployment and Downloading Methods

AREMP field crews have calibrated, deployed and downloaded instream and air temperature sensors for the last six field seasons (2011-2016). 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 2016, 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 2016.

	Instream (water)	Stream-side (air)	Upslope (air)
Oregon	121	116	98
Washington	54	55	44
Total	175	171	142

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 2016, AREMP crews visited 77 watersheds to download and deploy sensors and specialists from local units visited 61 watersheds for a total of 138 watersheds visited. During these visits any sensors lost over the winter were replaced. Approximately 22% 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 .

Stream side air temperature thermographs were monitored in 52 watersheds and upslope air temperature thermographs in 45 watersheds in Oregon and Washington.

Lessons Learned and Future Considerations

This project is now in its sixth 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 2017 field season we will continue to replace 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.

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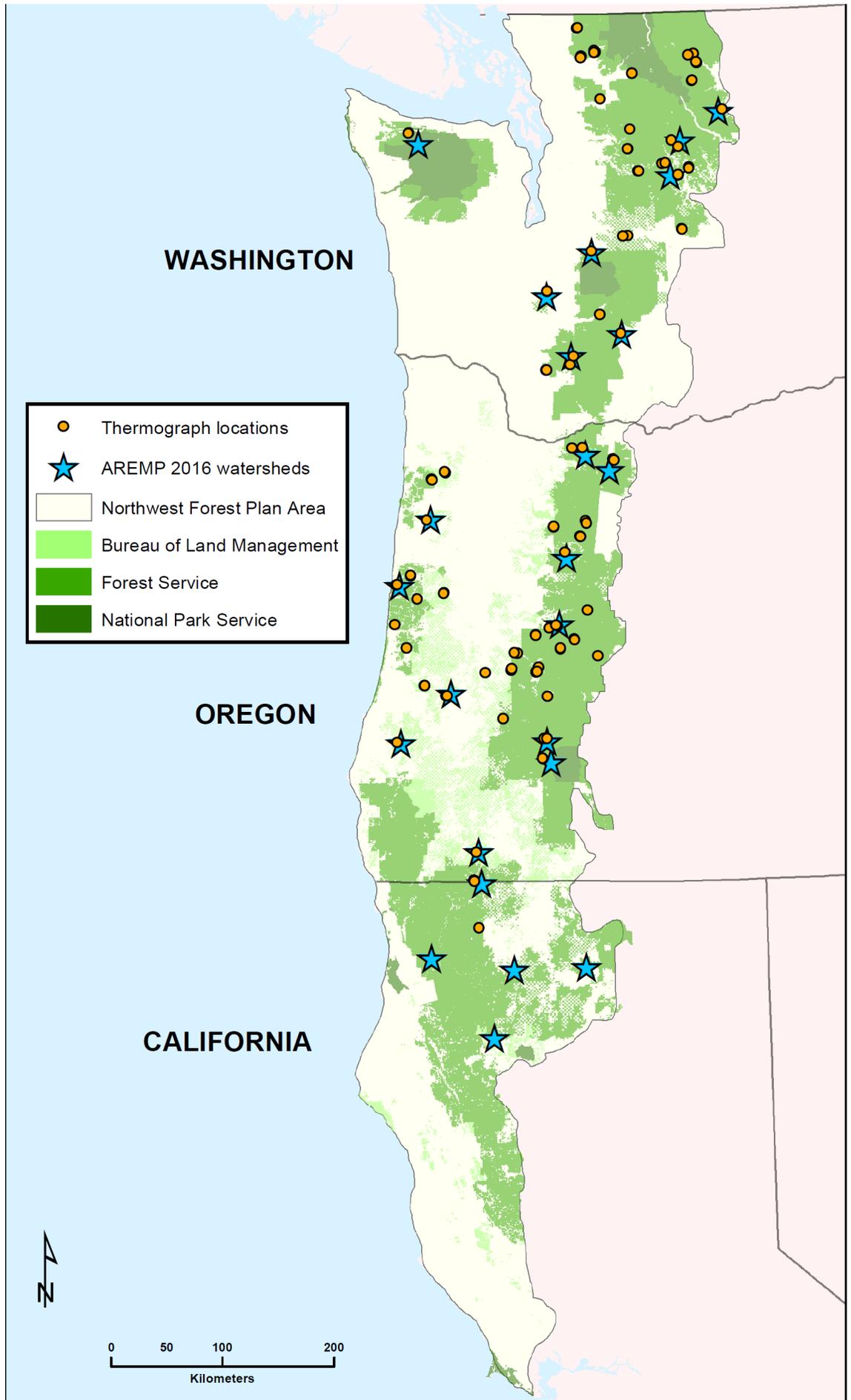


Figure 1. Location of instream and air temperature sensors placed by AREMP in the Northwest Forest Plan area. The blue stars represents watersheds surveyed for stream condition by AREMP in 2016. The orange circle designates watersheds with thermographs downloaded in 2016. (map made by Steve Wilcox—AREMP)