Aquatic and Riparian Effectiveness Monitoring Program

Interagency Monitoring Program – Northwest Forest Plan Area

Adlena Geraci photo

2008 Annual Technical Report

Steve Lanigan, Kirsten Gallo, and Chris Moyer

Aquatic and Riparian Effectiveness Monitoring Team
USDA Forest Service Pacific Northwest Regional Office
Bureau of Land Management Oregon State Office

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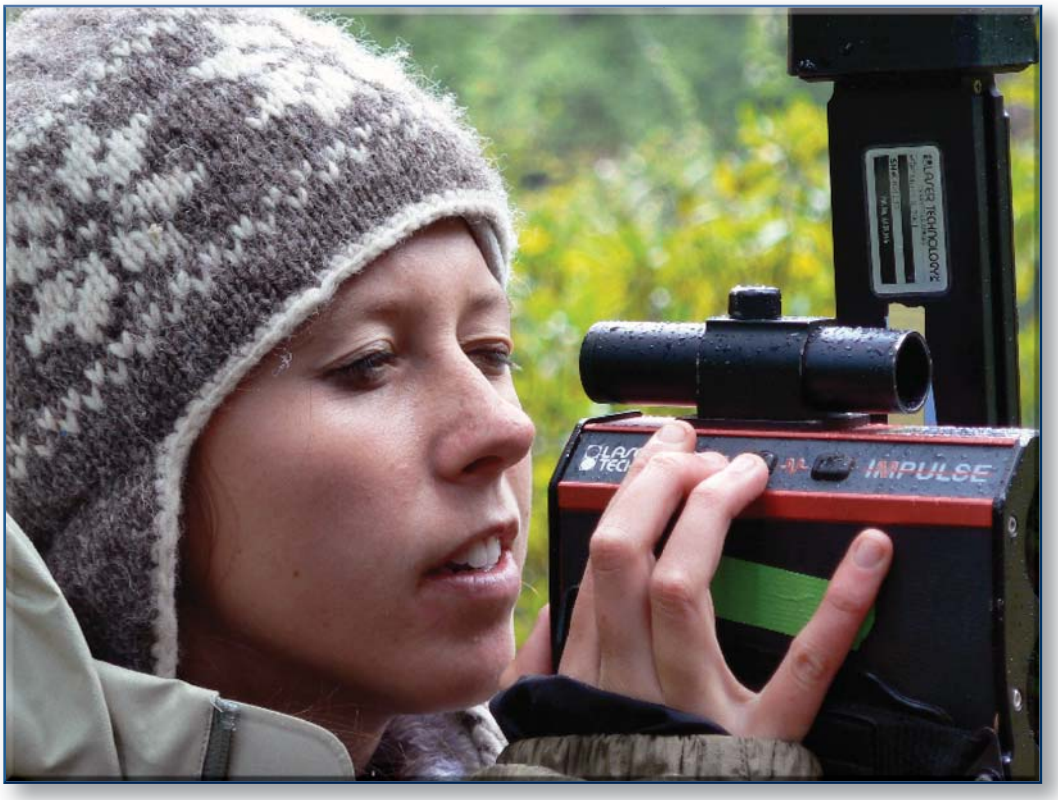
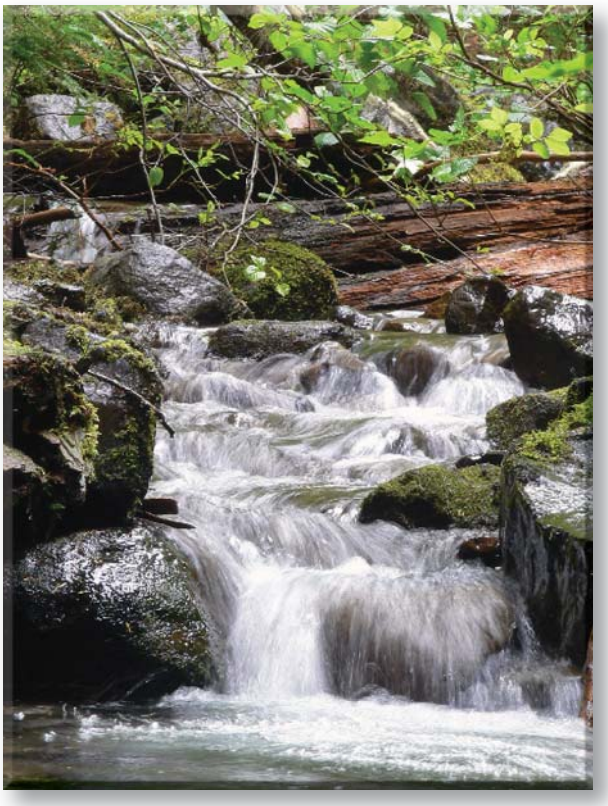


Executive Summary



The Aquatic and Riparian Effectiveness Monitoring Program (AREMP or the monitoring program hereafter) is a "Service First" program consisting of US Forest Service (FS) and Bureau of Land Management (BLM) employees working together to evaluate if the Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy is maintaining and restoring watershed condition within the NWFP area. The NWFP provides management direction for 24 million acres of federal lands in western Washington and Oregon, and northern California. Highlights of AREMP accomplishments during the 2008 fiscal year include:

Continuing to refine the decision-support models used to assess watershed condition:

- Held five workshops to refine aquatic province decision-support models used to assess watershed condition.
- Added new metrics to each aquatic province watershed condition decision-support model, including a landslide risk assessment and macroinvertebrate metrics.
- Assembled GIS layers used in the decision-support models.

Assisting local units in the use of decision-support models:

- Assisted FS aquatic specialists in the use of our watershed condition decision-support models to:
  - Identify key watersheds for forest plan revisions.
  - Evaluate the contribution of FS lands to the sustainability of aquatic species.

Completing a successful field season:

- Collected stream data from 21 watersheds to measure physical and biological attributes used to assess watershed condition as part of our normal field sampling program.
- Continued our quality control program by resurveying 25 sites, as well as an additional 20 sites first surveyed in 2007 to detect watershed condition trends.
- Participated in the second year of a pilot regional aquatic invasive species survey program.
- Stayed within our allotted budget. The average cost to sample each watershed was $39,228.

- Used Student Conservation Association interns as a successful component of the summer field staff.

Continuing our participation in the Pacific Northwest Aquatic Monitoring Partnership (PNAMP):

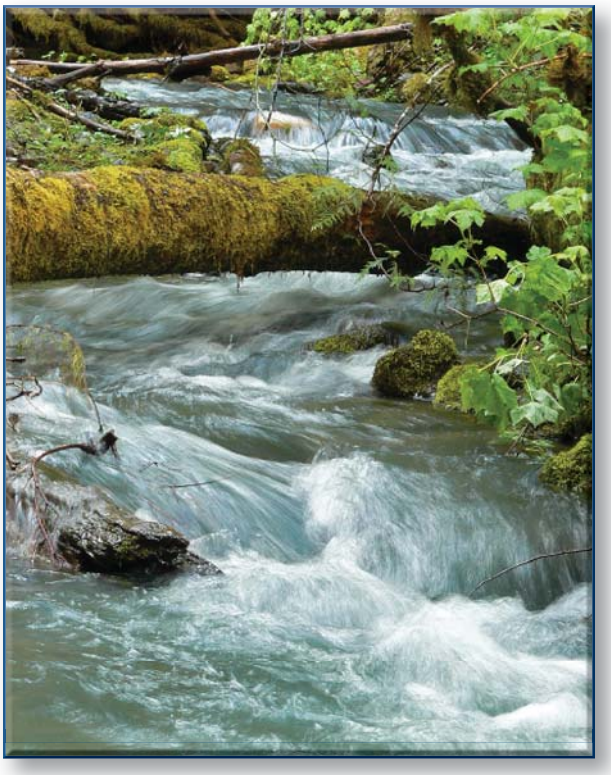
- Provided technical reviews for a manuscript describing a side-by-side protocol comparison test for in-channel physical attributes in the John Day Basin, OR conducted during summer 2005. The manuscript will be submitted for publication in 2009.

- Helped plan and participated in Lower Columbia River Endangered Species Act salmon recovery area workshops where state and federal agencies are proposing to use a master sample design to determine sampling sites, establish common protocols, and share data for habitat status and trend monitoring.

- Helped plan a November 2008 workshop for determining the "state of the art" regarding habitat intrinsic potential for fishes in the Pacific Northwest.

Stream surveyors measured the size of wood and counted the number of wood jams throughout each randomly chosen stream reach.

Introduction



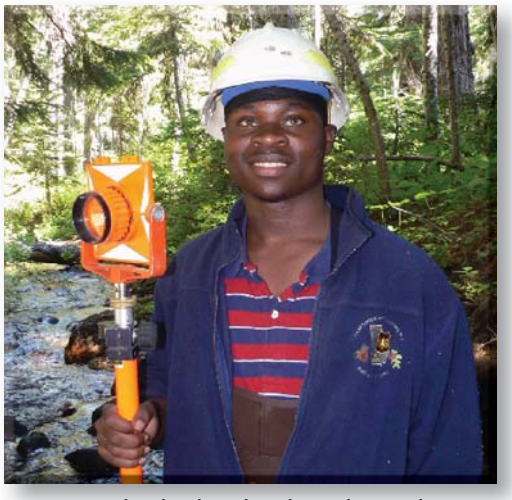
This report provides an account of the Aquatic and Effectiveness Monitoring Program's (AREMP) monitoring efforts in fiscal year 2008 (October 2007 - September 2008). During 2008, AREMP worked toward or accomplished several key objectives. A complete discussion of each of these accomplishments is provided in subsequent sections. Updates are also provided for budget and personnel required to accomplish the tasks assigned to the monitoring program.

The Northwest Forest Plan (NWFP), a management strategy applied to 24 million acres of federal land in the Pacific Northwest, was approved in 1994. The NWFP includes an Aquatic Conservation Strategy that requires the protection, restoration, and monitoring of aquatic ecosystems under the Plan's jurisdiction (USDA-USDI 1994). AREMP was developed to fulfill the monitoring component of the strategy. The overall objectives of the monitoring program include:

- Assessing the condition of aquatic, riparian, and upslope ecosystems;
- Developing ecosystem management decision support models to refine indicator interpretation;
- Developing predictive models to improve the use of monitoring data;
- Providing information for adaptive management by analyzing trends in watershed condition and identifying elements that result in poor watershed condition; and
- Providing a framework for adaptive monitoring at the regional scale (Reeves et al. 2004).

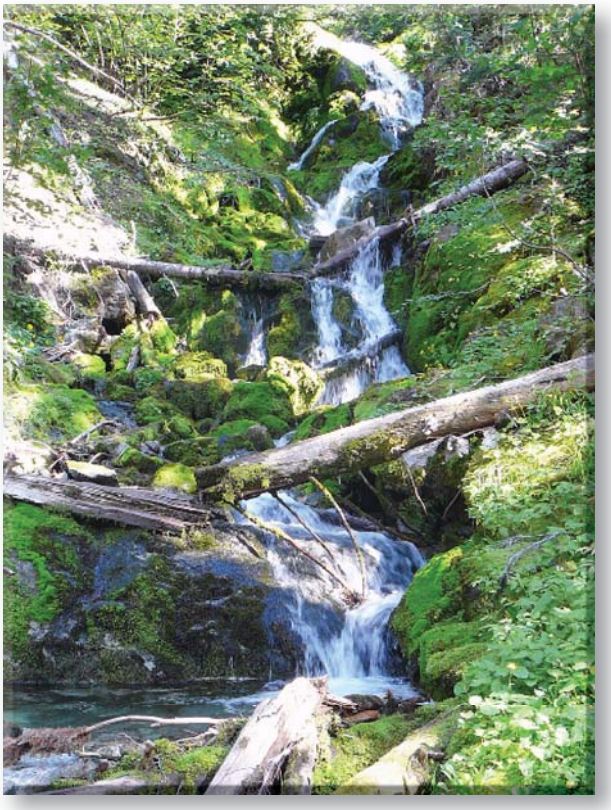
Monitoring is conducted at the subwatershed scale (US Geologic Survey 6th-field hydrologic unit code [HUC]). These subwatersheds (hereafter referred to as "watersheds") are approximately 10,000-40,000 acres in size.

A preliminary assessment of watershed condition throughout the NWFP area was done for 250 watersheds as part of a NWFP 10-year assessment in 2004 (Gallo et al. 2005). A 15-year assessment of watershed condition in every 6th-field watershed in the Plan area that has at least 25 percent federal ownership along the stream will be done in 2009.



We invited a high school student who was interested in pursuing a career in fisheries to participate in our stream surveys.

Accomplishments



Jeff Metzger photo

Refine Decision-Support Models We Use to Assess Watershed Condition

New watershed condition model attributes - landslide risk

New attributes were added to the decision-support models this year, including change in landslide potential due to management and macro invertebrate metrics. Change in landslide potential is determined using GIS. Attributes such as slope and hill shape derived from digital elevation model (DEM) layers are used to determine landslide potential. Baseline landslide potential in a watershed is determined by laying a vegetation layer on top of the DEM and calculating potential failure rates. It was assumed that presence of vegetation decreases landslide potential. For the baseline landslide potential, all forest capable areas were assumed to be forested. To determine any change in landslide potential due to management, we assumed that stand-replacing vegetation events (harvest and fire) increased landslide potential as does the presence of roads. We then expressed the attribute of change in landslide potential as the ratio of landslide potential under management to baseline landslide potential. We recognize that the baseline landslide potential is likely to be underestimated (and change due to management is overestimated) because we did not capture forest losses due to natural disturbance such as fire and blow downs.

New watershed condition model attributes - macro invertebrate metrics

We worked with researchers from the Environmental Protection Agency (EPA) and Oregon State University to determine which macro invertebrate metrics to use in our decision-support models. We combined data from 1,041 sites sampled by AREMP with 211 sites sampled by the EPA under their Western Environmental Monitoring and Assessment Program (EMAP)

Six macroinvertebrate metrics were selected for use in the watershed condition decision-support model.

(Kaufman et al. 1999). Inclusion of the EMAP sites allowed us to consider forested lands in the Northwest Forest Plan area that are not federally managed. We classified AREMP sites as reference based on roads and harvest data. Reference watersheds had no roads and no harvest since 1972. We evaluated the metrics in terms of their sensitivity to management activities, their signal to noise ratio, and redundancy between metrics. The metrics selected for inclusion in the model include: % taxa in ephemeroptera, plecoptera, and tricoptera (a species composition metric); % taxa in scrapers (a feeding group metric); % taxa in climbers (a habitat metric); and % intolerant taxa (a tolerance metric). Richness and diversity metrics were not significant.

Watershed condition workshops

Specialists from the FS, BLM, other state and federal agencies, and non-profit organizations joined researchers in refining decision-support models during a series of five workshops held in spring 2008. AREMP staff will use these models to assess watershed condition for the 15-year evaluation of the NWFP in 2009. The purpose of the evaluation is to determine whether FS and BLM management actions are maintaining or improving watershed condition in the Plan area. Watershed condition will be assessed in every 6th-field watershed in the Plan area that has at least 25 percent federal ownership along the stream. Assessments of watershed condition are based on a combination of field data, GIS, and remote sensing data for in-stream, riparian, and upslope indicators.

Assembling new GIS layers

The spatial data used in the decision-support models rarely exist in a continuous uniform layer for the NWFP area. The BLM and Forest Service maintain separate road data that must be pieced together for our analyses. New information is being incorporated into the model, such as grazing, acres harvested and motorized trails. This information has to be collected from each agency and then appended together. Compiling data from multiple agencies and sources is problematic because of varying data standards, formats, and attributes. The new vegetation layer, Interagency Mapping and Assessment Program (IMAP) (Ohman and Gregory 2002) is now consistent over the whole NWFP area, but structured very differently than the old Interagency Vegetation Mapping Project (IVMP) and the Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) layers (Moeur et al. 2005) used in our 10-year assessment of watershed condition (Gallo et al. 2005), so our data models have to be adapted to this new structure.

Assist Local Units

Forest plan revisions

Program personnel worked with specialists on the Okanogan-Wenatchee and Colville National Forests, the FS Pacific Northwest Regional Office, and forests in the Blue Mountains (Umatilla, Malheur, and Wallowa-Whitman) to apply decision-support models in their forest plan revisions. AREMP's watershed condition model is being used by these forests as part of the key watershed designation process and to evaluate the contribution of FS lands to the sustainability of aquatic species. The sustainability assessment is required by the 2008 Planning Rule. Key watershed determinations are requirements of a new proposed Aquatic and Riparian Conservation Strategy that will be applied across Oregon and Washington (US Forest Service Pacific Northwest Region). The new strategy will be part of each forest's plan, and will replace previous management plans such as the Northwest Forest Plan, PacFish, and InFish as plans are revised. The processes for determining key watersheds and conducting the sustainability analysis have undergone scientific peer review and the final draft of the document is being prepared.

Field Sampling Accomplishments

Twenty-one watersheds spread throughout the Plan area were sampled during 2008 (Figure 1, App A-1). These watersheds were sequentially sampled from the subset of the 250 watersheds originally selected for monitoring the NWFP. The

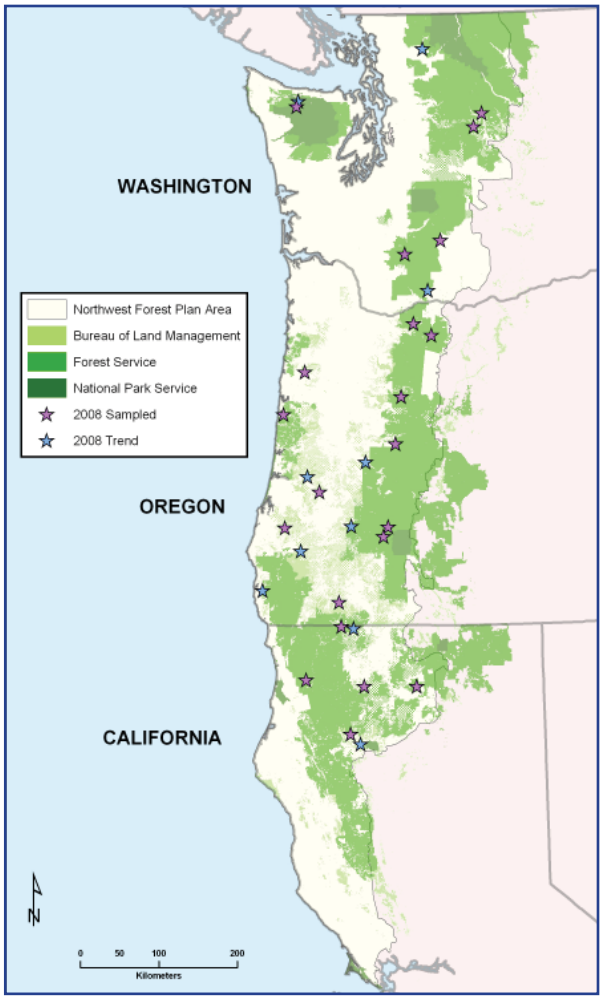


Figure 1. Map of the watersheds surveyed during the 2008 field season. Watersheds coded in purple indicate initial survey locations. Watersheds coded in blue are watersheds where a site was surveyed in 2007 to assess our quality control efforts and then was resurveyed in 2008 for use in detecting watershed condition trends.

Stream survey crews used laser levels and stadia rods to map stream channel profiles.

250 watersheds were selected at random using a generalized random tessellation sampling design, which guarantees a spatially balanced sample (Stevens and Olsen 2003, 2004). Watersheds had to contain a minimum of 25 percent federal ownership (FS, BLM, or US National Park Service) along the total length of the stream (1:100,000 National Hydrography Dataset stream layer) to be considered for sampling in the monitoring plan. Twenty-five sites were resurveyed as part of the quality control program. Twenty sites from 2007 were also surveyed for trend purposes (App A-2).

During the 2008 field season, five watersheds were dropped from the sample list for various reasons:

- Three were dropped due to inaccessibility (crews were unable get into the watershed);
- One was dropped due to access and marijuana growing concerns; and
- One was dropped because the stream was too large to survey (safety).

Protocol changes

There were three changes to the field sampling protocol this year:

1) We added a protocol to measure in-stream shade to validate a regionally developed shade prediction model (see description below).

2) We formalized how much time is spent searching for riparian invasive species to five minutes on each bank between three sets of transects.

3) We increased to ten the number of depth measurements taken at each transect (10, 30, 50, 70, and 90 % of the bankfull width as well as left bankfull elevation, left wetted edge, thalweg, right wetted edge, and right bankfull elevation). Formally, only eight measurements (25, 50, and 75 % of the bankfull width as well as left bankfull elevation, left wetted edge, thalweg, right wetted edge, and right bankfull elevation) were done.

Quality assessment program

The monitoring program's Quality Assessment Program includes several components. The data manager served the key role of inspecting data for errors (both correctable and non-correctable) and relayed mistakes back to the field crews to prevent further errors in data collection. The data manager was also responsible for inspection of calculated attributes (summarized raw data) for outlying errors. Quality assessment information is also used to identify needed improvements in protocol training for the next field season.

Trend analysis

During the fall of 2008 we undertook an analysis project with statisticians at Oregon State University to explore our ability to detect trends based on the field attributes. This project incorporates the 2002 – 2007 field data. The primary objective is to explore the amount that individual attributes would need to change in order to detect that change given the variation in the attribute (both variation in measurements and the environment). A preliminary draft of this analysis is expected in spring of 2009.

Provide surveying support to units for restoration efforts

We assisted the Fisheries and Hydrology staff of the Roseburg BLM district on a project to map existing channel configuration at the beginning of a restoration project so that changes could be measured through time. Six sites (in two watersheds) totaling approximately 6000 feet were intensively mapped (on the order of 1 point per foot of stream length) in order to capture the existing channel and habitat features. Mapped habitat features included different types of substrate bar classifications (distinguished from bed load material), wood (both natural and placed), exposed bedrock sheets, and information about the existing pools (Figure 2). The work took place in the fall and we utilized field crew members who stayed on after our regular field season ended.

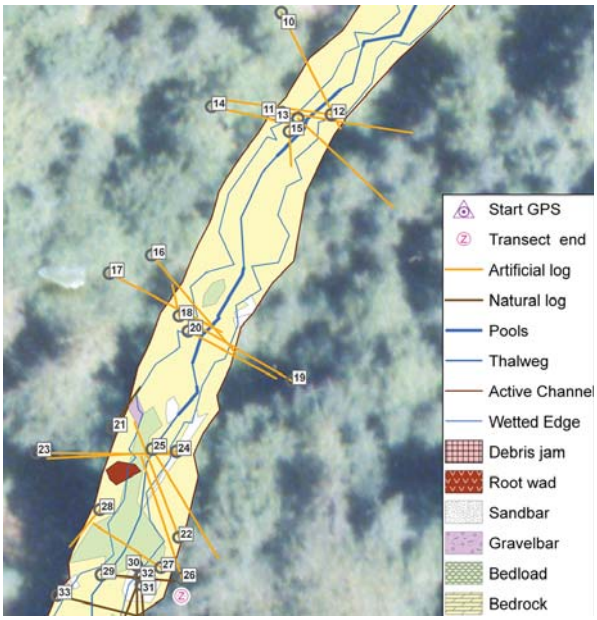


Figure 2. Detailed site maps produced by AREMP staff will be used by BLM district specialists to help plan and monitor stream channel restoration projects.

Shade measurements

AREMP staff joined into a partnership with FS and BLM hydrologists to expand the spatial extent of a "rapid shade model" developed for stream shade assessments. The model was originally developed for the Siskiyou National Forest. AREMP survey

A solar pathfinder was used to measure the amount of shade at stream transects. These data will be used to validate a shade model.

crews collected stream shade measurements in 31 sampled watersheds. Additional data will be collected during the 2009 field season. These data will be used to validate the model for use throughout the NWFP area. When the model validation is complete, AREMP will use the results of the model in watershed condition assessments. Other uses of the model include developing water quality recovery plans and planning for vegetation treatment and stream restoration projects.

Aquatic invasive species surveys

AREMP staff participated in the second year of a pilot regional survey effort to locate aquatic invasive species on federal lands. Protocols developed by Oregon State University Sea Grant College Program personnel were used to survey for 11 aquatic plants and animals identified as primary threats to northwest watersheds. Among the key species included were; New Zealand mudsnails, zebra mussels, quagga mussels, yellow flag iris, knotweed, hydrilla, Chinese mitten crabs, and four species of nonnative crayfish. Also, included were fifteen species of secondary concern.

Documentation and in-the-field training on species identification, data collection, and reporting was provided to AREMP field coordinators and crew leaders by personnel from the Oregon State University Sea Grant Program. The pilot program field protocols were implemented at the start of the

New Zealand mudsnails, zebra mussels and quagga mussels are sometimes too small to be readily seen in the field. However, their presence would be detected when the macroinvertebrate samples we collect are processed.

field season and did not interfere with AREMP field crews' ability to complete surveys in an efficient manner. Field crews encountered a few species of secondary concern (Himalayan blackberry, *Rubus discolor*; garlic mustard, *Alliaria petiolata*; giant hogweed, *Heracleum mantegazzianum*; and hydrilla, *Hydrilla verticillata*).

Although none of the species of primary concern were detected by AREMP field crews, our data provide a baseline for detecting the future spread of aquatic invasive species.

Pacific Northwest Aquatic Monitoring Partnership

Support continued for the cooperative monitoring efforts between state, federal, and tribal agencies within Washington, Oregon, California, and Idaho – known as the Pacific Northwest Aquatic Monitoring Partnership (PNAMP). AREMP staff participated in the following activities.

Inter-agency side-by-side protocol test

The Watershed Workgroup continued its efforts to prepare a manuscript describing the results of an inter-agency side-by-by-side protocol test. Data were collected during summer 2005 in the John Day Basin (eastern-central Oregon).

The data analysis of the protocol test is being conducted by Dr. Brett Roper (USDA Forest Service National Monitoring Coordinator), with an expected completion date during 2009.

The USDA Rocky Mountain Research Station is also analyzing data collected during intensive surveys of the same segments of stream to establish a baseline set of values from which to compare the results of the different protocols. Data collected using light detection and ranging (LiDAR) technology was also collected and will be compared to the intensively sampled stream data and to the agency/group collected data. Analyses are expected to be completed and presented in 2009.

Status and trend watershed/stream integrated monitoring program

The Watershed Workgroup held workshops in 2008 to explore the possibility of creating an integrated monitoring program for watershed/stream status and trend monitoring efforts.

The goal is, within 10 years, to create an integrated, interagency aquatic status and trend monitoring program to provide annual, statistically valid data on a set of agreed-upon stream, riparian, and upslope indicators of the condition of aquatic/riparian resources across the Pacific Northwest at statewide and finer scales of spatial resolution.

The workgroup endorsed using the Lower Columbia Endangered Species Act (ESA) salmon recovery area as a demonstration area.

Eleven different state, federal, and tribal monitoring groups participated in the John Day basin side-by-side protocol test.

Program Updates

Fiscal year 2008 budget

During the 2008 field season, the program employed 26 persons directly tied to the summer field work; five personnel represent core staff (permanent and TERM employees) and the balance represents summer-seasonal employees and Student Conservation Association interns.

It cost $6538 to sample each site. This cost is derived from taking our total budget and dividing by the number of sites sampled, and includes sampling trend sites and QA/QC sites as well as overhead and other non-field related costs. The cost to sample a watershed (based on sampling an average of 6 sites in each watershed) was $39,228.

Staffing update

We learned that consolidating a GIS technician position and a data manager position into a single data manager/GIS specialist resulted in too much work for one person to accomplish. We therefore split the duties between a data manager position (focused on database support to field crews and creation of an integrated geospatial-database) and a GIS cartographer position (focused on map-based support for field crews, management of the photo database, and map production). We also increased our stream survey crew size from three to four people because 1) it was much more efficient to have four people on each crew since most of the protocols involved two people; and 2) we added two new attributes: invasive species and shade measurements.

Student Conservation Association interns

Four Student Conservation Association (SCA) interns were hired as crew members during the 2008 field season. Compared to hiring GS-0404-05 Biological Science Technicians, there was a $56,000 cost savings to the program. We continued to collect high quality data and provided valuable work experience to the interns. Seven of the GS-grade employees we hired in 2008 were formerly AREMP SCA interns: two were hired as crew leaders and another five were hired as crew members. Overall, this was a very successful partnership and one we plan to continue in 2009.

Student Conservation Interns participated in our two weeks of training, including a wilderness first aid course.

Annual watershed reports and data available on program website

To facilitate the use of field and GIS data by local area managers, the program continues to place the annual Watershed Reports and associated data onto the monitoring program's web site. Data from 2002 to 2006 are now available on the website. Data from the 2007 and 2008 field seasons will be available on the site in 2009. The current web page will be updated to show links to the reports and data. At the writing of this document, the reports and data will be posted at http://www.reo.gov/monitoring/reports/watershed/aremp/aremp.htm (this is subject to change depending on constraints of the website). Summarized data, rather than individual measurement data, are posted on the web; however measurement data are available by contacting AREMP's data manager, who will provide any requested information.

Data requests

In 2008, the monitoring program continued to provide data from our field surveys to local management units, Oregon Department of Fish and Wildlife, and other state and federal offices. The following are the filled data requests for 2008:

- Location points and photos of the foothill yellow-legged Frog were sent to the Umpqua National Forest. This was the first documented sighting of this species along the survey reach.

- Invasive flora species data were sent to the, FS Pacific Northwest Region Aquatics Program, and Oregon State University Sea Grant College Program and Extension Service.

- Permit reports containing all captured fish and amphibian species were provided to National Oceanic Atmospheric Administration – National Marine Fisheries Service (NOAA-NMFS), US Fish and Wildlife Service (USFWS), California Department of Fish and Game, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Olympic National Park, and Mt. Rainier National Park.

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- Macro invertebrate results were sent to University of California-Berkeley and the Klamath National Forest.

- Survey data were sent to Mt. Baker-Snoqualmie National Forest.

- Thermograph data were sent to Willamette NF Detroit District Area.

- Calculated survey attributes were sent to the Columbia Basin Fish and Wildlife Authority.

- Water chemistry data were sent to the FS Pacific Northwest Regional Office Air Quality Program specialist.

- Calculated survey attributes were sent to the Shasta-Trinity National Forest for all AREMP site on that forest.

- Other, non-specific data requests were directed to the AREMP data download website; http://www.reo.gov/monitoring/reports/watershed/aremp/aremp.htm

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Acknowledgments

The Aquatic and Riparian Effectiveness Monitoring Program is an interagency effort resulting from the contributions of the FS, BLM, NOAA-NMFS, USFWS, US National Park Service, California Indian Forestry and Fire Management Council, Northwest Indian Fisheries Commission, Intertribal Timber Council, and US Army Corps of Engineers. Funding was provided by FS Region 6 and Region 5, BLM Oregon State Office, NOAA-NMFS, EPA.

The program benefited greatly from contributions from Gordie Reeves, Kelly Burnett, Phil Larsen, and Brett Roper. Jerry Freilich of the Olympic National Park and Erik Taylor and Dan Dammann of the Roseburg BLM provided support and guidance for the logistics of field crews. Pam Sterling of the BLM Oregon State Office was critical in executing the Student Conservation Association agreement. Special thanks to Karen Schank for arranging for the opportunity and Art Rambo (both of the Medford BLM) for providing much needed input on crew survey techniques. Sam Chan and Tania Siemens of the Oregon State University Oregon Sea Grant Extension and Robin Draheim of Portland State University provided support and guidance in the implementation of the invasive species monitoring protocol. Margie Witt, Beth Snyder, and Eddy Nelson all of the Siulsaw National Forest provided excellent support for both hand-held and vehicle radios; purchasing help and guidance; and fleet help and support, respectively. Bev Rhode of the Siuslaw National Forest was instrumental in overcoming logistics with field going laptop computers. Bill Powers of the National Resources Information Systems provided advice on future direction for data collection and storage mechanisms. Finally, Doug DeGross of the USGS Forest and Rangeland Ecosystem Science Center provided amphibian capture and identification training for the field crews.

Tom Iraci photo

AREMP honored with a National 2007 Service First Award

Ed Shepard (BLM Oregon State Office Director - 3rd from left) and Mary Wagner (FS Pacific Northwest Regional Forester - far right) presented AREMP staff with a National 2007 Service First Award in recognition of the substantial savings and operational efficiency resulting from having one monitoring program for both the FS and BLM. Pictured AREMP staff from left to right are Hank LaVigne, Michel Mouzong, Chris Moyer, Kirsten Gallo, and Steve Lanigan. Not pictured are Peter Eldred, Steve Wilcox, and Pete Gruendike.

Peter Eldred coordinated GIS and remote sensing data. Mark Isley handled data processing and database management. Michel Mouzong handled travel and timesheets for the program during the field season. Steve Wilcox developed the field maps for the crews. Peter Gruendike and Hank LaVigne handled field crew coordination. Zack Reeves led, Brian Sogge assisted, and Forrest Kaye supported the successful implementation of the Field Reconaissance component of the summer field effort. Summer field staff included: Morgan Garay, TJ Krug, Andrew Janos, John Speece, , Beth Kroitz, Jenine Toby, Jeff Metzger, Anson Friar, Wendy Crouse, Heather Mackey, April Lindeman, Jason McFarland, Emily Lang, Adlena Geraci, and Amanda DeLima.

Photos by Steve Lanigan unless noted.

Kim Titus photo

AREMP 2008 summer crew members.

Appendix A - Watersheds Surveyed in 2008

Appendix A-1. Watersheds surveyed in 2008 as original surveys with the number of sites surveyed in each watershed. QA/QC sites are where a second independent crew returned to sample the same reach to determine variability in our measurements.

State	Province	Local Unit	6th Field HUC	6th Field HUC Name	Creek Code	County	Number of Sites	QA/QC Sites
CA	Klamath Siskiyou	Shasta/Trinity NF	180102110605	Weaver Creek	CAWVR	Trinity	7	0
CA	Klamath Siskiyou	Six Rivers NF	180102090801	Cedar Creek	CACDR	Siskiyou	6	2
CA	Klamath Siskiyou	Klamath NF	180102080103	Noyes Valley	CANOY	Siskiyou	7	2
CA	High Cascades South	Shasta/Trinity NF	180200040106	Lower Ash Creek	CASSH	Siskiyou	8	2
OR	Western Cascades	Willamette NF	170900050301	Upper Blowout Creek	ORBLW	Linn	5	0
OR	Klamath Siskiyou	Mdeford BLM	171003090403	Applegate River/Humbug Creek	ORCHP	Jackson	6	0
OR	Coast Range	Salem BLM	171002040402	Lower North Fork Of Siletz River	ORSTZ	Polk	5	2
OR	High Cascades North	Mt Hood NF	170701050601	Upper East Fork Hood River	OREFH	Hood River	7	0
OR	Klamath Siskiyou	Rogue River NF	171003090103	Elliott Creek/Dutch Creek	ORLEL	Siskiyou	4	2
OR	Western Cascades	Mt Hood NF	170800010501	Blazed Alder Creek	ORBLZ	Clackamas	6	2
OR	Coast Range	Roseburg BLM	171003030106	Yellow Creek	ORYEL	Douglas	5	0
OR	Western Cascades	Umpqua NF	171003010501	Fish Creek Headwaters	ORCLR	Douglas	7	2
OR	High Cascades South	Rogue River NF	171003070105	Rogue River/Foster Creek	ORFST	Klamath/Douglas	6	0
OR	Western Cascades	Willamette NF	170900040307	South Fork Mckenzie River/Cougar Reservoir	ORWLK	Lane	6	2
OR	Coast Range	Coos Bay BLM	171003050405	Elk Creek	OREKK	Coos	6	2
OR	Coast Range	Siuslaw NF	171002050405	Alsea River /Eckman Creek	ORALS	Lincoln	5	2
WA	Northern Cascades West	Wenatchee NF	170200110303	Chiwaukum Creek	WACWK	Chelan	6	2
WA	Northern Cascades West	Wenatchee NF	170200110203	Lower Chiawa River	WALCH	Chelan	6	0
WA	Western Cascades	Gifford Pinchot NF	170800020202	Clearwater Creek	WACWC	Skamania	5	2
WA	High Cascades North	Gifford Pinchot NF	170800040402	Walupt Creek	WAWPT	Lewis	4	0
WA	Olympic	Olympic NP	171001010402	Headwaters Sol Duc River	WASDR	Clallum	6	1

Appendix A-2. Watersheds surveyed in 2008 as trend surveys. These are in addition to the number of sites originally surveyed in each watershed.

State	Province	Local Unit	6th Field HUC	6th Field HUC Name	Creek Code	County	Number of Sites
OR	Franciscan	Siskiyou NF	171003120502	Lower Hunter Creek	ORHTR	Curry	2
WA	Northern Cascades West	Mt Baker/Snoqualmie NF	171100050806	Lower Baker River/Lake Shannon	WALBK	Skagit	2
WA	High Cascades North	Gifford Pinchot NF	170701051004	Middle Little White Salmon River	WALWS	Skamania	2
OR	Western Cascades	Umpqua NF	171003011106	Upper Cavitt Creek	ORCVT	Douglas	2
CA	Klamath Siskiyou	Klamath NF	180102060903	Bear Creek	CABER	Siskiyou	2
OR	Western Cascades	Willamette NF	170900010702	Lookout Point Reservoir	ORLOK	Lane	2
WA	Olympic	Olympic NP	171001010401	North Fork Sol Duc River	WASOL	Clallum	2
OR	Coast Range	Medford BLM	171003020803	West Fork Cow Creek/Elk Valley Creek	OREKV	Douglas	2
CA	Klamath Siskiyou	Shasty/Trinity NF	180102110603	Grass Valley Creek	CAGRV	Trinity	2
OR	Coast Range	Coos Bay BLM	171003030401	Paradise Creek	ORPDS	Douglas	2

Contact Information

Want to know more? Please contact:

Steve Lanigan, Team Leader	503.808.2261	slanigan@fs.fed.us
Kirsten Gallo, Aquatic Ecologist	541.750.7021	kgallo@fs.fed.us
Chris Moyer, Fisheries Biologist	541.750.7017	cmoyer@fs.fed.us
Peter Eldred, GIS Analyst	541.750.7078	peldred@fs.fed.us
Mark Isley, Database Manager	541.750.7081	misley@fs.fed.us

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