

GRAHAM MATTHEWS & ASSOCIATES

SURFACE WATER DATA COLLECTION AND ANALYSIS

Graham Matthews and Associates designs, builds, and operates a wide variety of streamflow and water quality monitoring stations. *GMA* uses a USGS style approach to surface water data collection and analysis. *GMA* specializes in working in remote and difficult to access areas and is capable of running surface water programs on small streams and large rivers alike. We collect surface water data utilizing numerous methodologies including: conventional wading and bridge techniques; bank-operated cableways; and highly-specialized cataraft



and boat-based measuring platforms. *GMA* is committed to using state of the art equipment and technology such as acoustic Doppler current profilers for both boat-based measurements and in-situ applications, AquaCalc Streamflow Computers for streamflow measurements, YSI multi parameter sondes for water quality investigations, and the WISKI time series management database for surface water computations. *GMA* maintains a large stock of equipment, and is able to set up monitoring programs rapidly.

Graham Matthews and Associates currently operates and/or computes surface water records for over 30 stations in California and Oregon. These stations include collection of streamflow, sediment and water quality/nutrient data as well as computation of water discharge, sediment discharge, and nutrient discharge. *GMA* is capable of developing and operating both short term (seasonal and temporary) and long term surface water monitoring programs.

Services Provided

- SURFACE WATER DATA COLLECTION PROGRAM DEVELOPMENT AND MANAGEMENT
- SURFACE WATER GAGING STATION INSTALLATION, MAINTENANCE, AND REPAIR
- STREAMFLOW DATA COLLECTION; WADING, BRIDGE, AND BOAT BASED
- CALIBRATION AND RATING CURVE DEVELOPMENT
- GAGING STATION LEVELS
- SURFACE WATER RECORD COMPUTATIONS (USGS STANDARDS)
- SURFACE WATER RECORDS REVIEW
- WATER QUALITY DATA COLLECTION; WADING, BRIDGE, AND BOAT BASED
- VELOCITY PROFILE DATA COLLECTION FOR CALIBRATION OF HYDRAULIC, SEDIMENT TRANSPORT, AND FISH HABITAT MODELS
- COMPUTATION AND EVALUATION OF WATER BUDGETS



All surface water data collected by **GMA** is entered and processed in the **A**Kisters WISKI Suite of Software. WISKI is a comprehensive hydrologic information processing software package that runs on a SQL server relational database platform. WISKI includes complete USGS compatible surface water computation routines as well as standardized reports. WISKI contains 4 core modules for cataloging and processing of hydrologic data; WISKI hydrological workbench, BIBER, SKED, and WQM.



The **WISKI hydrologic workbench** is a tool designed for the correction, analysis and management of hydrological time series data. The module **BIBER**, which is fully integrated in WISKI, is used for management and evaluation of flow measurements. **SKED**, the rating curve editor, is a module with tools for creating, managing and optimizing non-linear conversions of input parameters. And finally, **WQM**, the water quality module which is also fully integrated into WISKI.

Benefits offered by each WISKI module

WISKI HYDROLOGICAL WORKBENCH

- FAST AND EFFICIENT NAVIGATION TO DATA OF INTEREST
- THE USE OF “ORIGINAL” AND “PRODUCTION” TIME SERIES FOR RETENTION OF ORIGINAL DATA DURING THE EDITING PROCESS
- MANUAL EDITING OF PRODUCTION DATA USING BOTH GRAPHICAL AND TABULAR EDITORS
- RAPID PRODUCTION OF AGGREGATED DATA (DAILY/MONTHLY MEAN, MAX, MINS, ETC)
- AUTOMATED PLAUSIBILITY CHECKS USED TO EDIT ANOMALIES IN DATA SETS
- QUALITY FLAGS
- TRACKING OF EDITS BY USER

SKED - RATING CURVE MANAGEMENT

- SUPPORTS VARIOUS METHODS OF RATING CURVE DEVELOPMENT INCLUDING, EYE-FIT RATING ANALYSIS, STANDARD REGRESSION TECHNIQUES AND PREDEFINED WEIR FUNCTIONS
- ABILITY TO SET RATING CURVE LIMITS WHICH CARRY OVER TO DISCHARGE COMPUTATIONS
- GRAPHICAL DISPLAY OF THREE POINT SHIFTS ALONG WITH ASSOCIATED SHIFTED CURVE
- EASILY DEVELOP, EDIT, AND TRACK EDITS AND VALIDITIES WHILE MAINTAINING STANDARD HYDROLOGIC TECHNIQUES

BIBER - FLOW MEASUREMENT AND EVALUATION

- ORGANIZATION OF STREAMFLOW MEASUREMENTS
- RAPID ACCESS TO STATION, FLOW MEASUREMENTS, AND DEVICES
- GRAPHICAL AND TABULAR EVALUATION OF MEASUREMENTS

WQM - WATER QUALITY DATA MODULE

- ALLOWS FOR WATER QUALITY DATA TO BE FULLY INTEGRATED INTO WISKI TIME SERIES DATA.
- MANUAL AND AUTOMATIC COLLECTION OF SAMPLING DATA
- FLEXIBLE DATA MANAGEMENT
- EVALUATION AND REPRESENTATION OF WATER QUALITY DATA ON A TIME SERIES LEVEL
- DATA EASILY EVALUATED ON A STORM BY STORM, RISING/FALLING, OR SEASONAL BASIS

PROJECT SPOTLIGHT

LOST MAN CREEK STREAMFLOW AND TURBIDITY MONITORING

Lost Man Creek is a significant tributary to Prairie Creek, which in turn is a tributary to Redwood Creek. Like most of the redwood forest in northern California the watershed was heavily logged prior to implementation of the state's forest practice rules. Logging between the 1950's and the early 1970's consisted of large clearcuts, tractor yarding, and unregulated road building. These activities led to widespread erosion and sedimentation during large flows events such as those that occurred in 1955 and 1964.



In 1978 Redwood National and State Parks (RNSP) initiated a watershed restoration plan in order to reduce erosion and sedimentation of streams, and to restore the natural ecosystems to conditions similar to what would have existed before timber harvest and road building occurred. In order to reduce erosion and sedimentation RNSP has focused heavily on road removal. Road removal within the state and national park is accomplished through excavating stream crossings, re-contouring of road beds, and restoration of historic drainage patterns.

In 2003, as part of the watershed restoration plan, a monitoring plan was developed that included monitoring turbidity and suspended sediment concentration at newly removed stream crossings as well as at numerous downstream locations. The monitoring program has seen numerous improvements over the years but currently includes the operation of 5 continuous streamflow and turbidity monitoring stations. The gaging stations are



located on Lost Man Creek at the old Hatchery, Larry Dam Creek, North Fork of Lost Man Creek, Middle Fork of Lost Man Creek, and the South Fork of Lost Man Creek. GMA performs all operations of the stations including, maintaining the onsite equipment, maintaining accurate stage-discharge rating curves, performing storm related suspended sediment sampling and providing final computed flow values.

Graham Matthews and Associates and RNSP's long term monitoring activities in the Lost Man Creek Watershed has allowed RNSP to assess the effects of road removal restoration activities on downstream turbidity and suspended sediment concentrations. In addition, monitoring has providing adaptive management feedback for refining erosion control methods used by RNSP during road removal activities.

GMA is an experienced, diverse consulting firm established in 1990, comprised of hydrologists, geomorphologists, and biologists. The company is led by Graham Matthews, Principal Hydrologist, who has over 29 years experience in hydrology, fluvial geomorphology, and stream restoration design and construction.

REPRESENTATIVE SURFACE WATER PROJECTS

CLIENT	PROJECT
WESTERN SHASTA RESOURCE CONSERVATION DISTRICT	Geomorphic Monitoring of the Clear Creek Floodplain Rehabilitation Project: 2003 - 2010
TRINITY COUNTY RESOURCE CONSERVATION DISTRICT	South Fork Trinity River Water Quality Monitoring Project (for California Department of Fish and Game), 2001
CAMPBELL TIMBERLAND MANAGEMENT	South Fork Ten Mile River Surface Water and Sediment Transport Monitoring, 2002-2010
	South Fork Wages Creek Surface Water and Sediment Transport Monitoring, 2003-2005
KLAMATH BASIN RANGELAND TRUST	Wood River Valley Surface Water and Water Quality Monitoring, 2004-2010
THE KLAMATH TRIBES	Geomorphic Assessment of the Sprague River Watershed, 2004
REDWOOD NATIONAL AND STATE PARKS	Lost Man Creek Streamflow and Sediment Monitoring, 2003-2010
TRINITY RIVER RESTORATION PROGRAM, USBR	Trinity River Sediment Transport Monitoring, 2002, 2004-2009
WATERSHED RESEARCH AND TRAINING CENTER	Big Creek Watershed Resource Inventory, 2007-2008
TETRA TECH, INC.	Mad River Sediment Source Analysis, 2005-2007 Trinity River Sediment Source Analysis, 2001-2003 Albion River Sediment Source Analysis, 2000-2001 Noyo River Sediment Source Analysis, 1998
SANDY RIVER BASIN WATERSHED COUNCIL	Sandy River Sediment Transport Monitoring Project, 2008-2010
EL DORADO COUNTY	Angora Creek SEZ Restoration Project, 2003-2006
OTIS BAY ECOLOGICAL CONSULTANTS/USFWS	Walker River Streamflow and Sediment Transport Monitoring, 2008, 2009
US FISH AND WILDLIFE SERVICE	North Fork Battle Creek Sediment Transport Monitoring, 2009-2010

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