

Geomorphic Investigations

ACE has conducted numerous investigations in the field of applied geomorphology. Our staff has successfully integrated geomorphic studies with engineering studies to develop geomorphically-based solutions to complex watershed and stream channel problems. Project experience includes investigation of existing channel and streambank instability, identification and application of geomorphic design parameters, evaluation of geomorphic histories of disturbed channels, and development of geomorphically sound channel design.

Representative ACE projects include:

- *The Fossil Creek Stability Study, Fort Collins, CO:* This study included a detailed geomorphic evaluation of a highly meandering alluvial stream. Specific tasks included the investigation of historical channel behavior and bank stability, assessment of existing channel stability, characterization of areas of significant bank erosion, and development of techniques for both bed and bank stabilization to minimize both aggradation/degradation of the channel and the potential of lateral channel migration.
- *Animas River Geomorphic Study, Durango, CO:* A geomorphic, hydraulic, and sediment transport evaluation of the impacts of ongoing sand and gravel operations along the Animas River near Durango, Colorado. ACE staff evaluated the thalweg profile, reviewed bankline changes from 1964 conditions to present, and addressed historical, existing and future changes in channel flow conveyance capacity. An assessment was also made of channel degradation through and downstream of the mined reaches.
- *Clackamas River Geomorphic Study, Oregon City, OR:* ACE staff participated in the geomorphic, hydraulic and sediment transport evaluation of a reach of the Clackamas River. The scope of this study included an investigation of the potential for gravel mining operations to affect the river behavior at the site and cause material damage to adjacent properties and structures. The geomorphic analysis included classifying the river and studying the geomorphic stability of the channel in the vicinity of the mine, determination of the historic channel alignment through aerial photo analysis, and the assessment of channel migration and bank erosion rates at critical reaches. Rates of change prior to and during the active mining operation were quantified.



**Aerial Photo Depicting Clackamas River,
Oregon City, Oregon**

Geomorphic Investigations (Continued)

- *Colorado Yampa Coal Mine AOC Determination, Steamboat Springs, CO:* A geomorphic investigation was conducted at the Colorado Yampa Coal Mine to determine compliance with permit requirements of restoring the reclaimed site to approximate original contours (AOC). A complete slope analysis was conducted to determine slope distribution on a mine-wide basis. Standard geomorphic methods were used to prepare this analysis and included a statistical approach, which generated pre-and post-mining slope histograms.
- *Yazoo Basin Geomorphic Study, MS:* ACE staff participated in evaluation of over 100 miles of stream channel within the Yazoo Basin, Mississippi in support of the U.S. Army Corps of Engineers Demonstration Erosion Control Project. Field evaluation included assessment of bed and bank stability, sediment quantification, determination of geomorphic parameters and evaluation of overall geomorphic trends.
- *Sacramento River Geomorphic Evaluation, CA:* ACE staff participated in the geomorphic evaluation of numerous reaches of the Sacramento River, California. Involvement in these investigations included collection and analysis of geomorphic data, bank and bed stability assessment, sediment data, and hydrologic data. ACE staff also participated in the evaluation of changes in river morphometry through aerial photo analysis and supervised execution of detailed hydrographic surveys.