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Sedimentation Engineering

Processes, Measurements, Modeling, and Practice

Edited by Marcelo Garcia

ASCE



Sedimentation Engineering Asce Practice Manual 110

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Sedimentation Engineering Asce Practice Manual 110:

Sedimentation Arved J. Raudkivi, 2020-08-26 This monograph provides the practising engineer with a concise overview of the methods of water diversion and exclusion or removal of sediment from the diverted water The emphasis is on flow features and the associated conveyance of sediments Fluid Mechanics of Environmental Interfaces, Second Edition Carlo Gualtieri, Dragutin T. Mihailovic, 2012-11-21 Environmental Fluid Mechanics EFM studies the motion of air and water at several different scales the fate and transport of species carried along by these fluids and the interactions among those flows and geological biological and engineered systems EFM emerged some decades ago as a response to the need for tools to study problems of flow and transport in rivers estuaries lakes groundwater and the atmosphere it is a topic of increasing importance for decision makers engineers and researchers alike The second edition of the successful textbook Fluid Mechanics of Environmental Interfaces is still aimed at providing a comprehensive overview of fluid mechanical processes occurring at the different interfaces existing in the realm of EFM such as the air water interface the air land interface the water sediment interface the surface water groundwater interface the water vegetation interface and the water biological systems interface Across any of these interfaces mass momentum and heat are exchanged through different fluid mechanical processes over various spatial and temporal scales In this second edition the unique feature of this book considering all the topics from the point of view of the concept of environmental interface was maintained while the chapters were updated and five new chapters have been added to significantly enlarge the coverage of the subject area The book starts with a chapter introducing the concept of EFM and its scope scales processes and systems Then the book is structured in three parts with fifteen chapters Part one which is composed of four chapters covers the processes occurring at the interfaces between the atmosphere and the surface of the land and the seas including the transport of dust and the dispersion of passive substances within the atmosphere Part two deals in five chapters with the fluid mechanics at the air water interface at small scales and sediment water interface including the advective diffusion of air bubbles the hyporheic exchange and the tidal bores Finally part three discusses in six chapters the processes at the interfaces between fluids and biotic systems such as transport processes in the soil vegetation lower atmosphere system turbulence and wind above and within the forest canopy flow and mass transport in vegetated open channels transport processes to and from benthic plants and animals and coupling between interacting environmental interfaces Each chapter has an educational part which is structured in four sections a synopsis of the chapter a list of keywords that the reader should have encountered in the chapter a list of questions and a list of unsolved problems related to the topics covered by the chapter The book will be of interest to graduate students and researchers in environmental sciences civil engineering and environmental engineering geo physics atmospheric science meteorology limnology oceanography and applied mathematics Erosion and Sedimentation Pierre Y. Julien, 2010-06-10 The second edition of this acclaimed accessible textbook brings the subject of sedimentation and erosion up to date providing an

excellent primer on both fundamental concepts of sediment transport theory and methods for practical applications The structure of the first edition is essentially unchanged but all the chapters have been updated with several chapters reworked and expanded significantly Examples of the new additions include the concept of added mass the Modified Einstein Procedure sediment transport by size fractions sediment transport of sediment mixtures and new solutions to the Einstein Integrals Many new examples and exercises have been added Erosion and Sedimentation is an essential textbook on the topic for students in civil and environmental engineering and the geosciences and also as a handbook for researchers and professionals in engineering the geosciences and the water sciences *Sedimentation Engineering* American Society of Civil Engineers. Task Committee for the Preparation of the Manual on Sedimentation, Environmental and Water Resources Institute (U.S.). ASCE Task Committee to Expand and Update Manual 54, 2008 MOP 110 presents extensive advances in methods of investigation measurement and analysis in the specialized field of sedimentation engineering **Sediment Transport Dynamics** Weiming Wu, 2023-11-21 This book focuses on the fundamentals of sediment transport in surface waters It covers sediment properties open channel flows sediment particle settling incipient motion bed forms bed load suspended load total load cohesive sediments water sediment two phase flows hyperconcentrated flows debris flows wave induced sediment transport turbidity currents and physical modeling Besides the primary context of river sedimentation this book extensively covers sediment transport under coexisting waves and currents in coasts and estuaries hyperconcentrated and debris flows in rivers as well as turbidity currents in lakes reservoirs channels and the ocean It includes a chapter on the water sediment two phase flow theory which is considered the basis of many sediment transport models It introduces some special topics have that emerged in recent years such as the transport of mixed cohesive and noncohesive sediments biofilm coated sediments and infiltrated sand within gravel and cobble beds The text merges classical and new knowledge of sediment transport from various sources in English and non English literature and includes important contributions made by many scientists and engineers from all over the world It balances the breadth depth fundamental importance practical applicability and future advancement of the covered knowledge and can be used as a text and reference book The chapters are arranged in a useful sequence for teaching purposes Certain homework problems are prepared which also highlight the important topics for instructors to select Solutions to homework problems are available from the author by request

Handbook of Climate Change Impacts on River Basin Management Saeid Eslamian, Mir Bintul Huda, Nasir Ahmad Rather, Faezeh A. Eslamian, 2024-08-26 Climate change not only involves rising temperatures but it can also alter the hydro meteorological parameters of a region and the corresponding changes emerging in the various biotic or abiotic environmental features One of the results of climate change has been the impact on the sediment yield and its transport These changes have implications for various other environmental components particularly soils water bodies water quality land productivity sedimentation processes glacier dynamics and risk management strategies to name a few This volume

presents a diverse collection of case studies from researchers across the globe examining the impacts of climate change on river basin management in various geographical hydrological and socioeconomic contexts The case studies yield important insights that can inform strategies to build resilience and adapt river basins to a changing climate Hydraulic Structures Sheng-Hong Chen,2015-06-09 This book discusses in detail the planning design construction and management of hydraulic structures covering dams spillways tunnels cut slopes sluices water intake and measuring works ship locks and lifts as well as fish ways Particular attention is paid to considerations concerning the environment hydrology geology and materials etc in the planning and design of hydraulic projects It also considers the type selection profile configuration stress stability calibration and engineering countermeasures flood releasing arrangements and scouring protection operation and maintenance etc for a variety of specific hydraulic structures The book is primarily intended for engineers undergraduate and graduate students in the field of civil and hydraulic engineering who are faced with the challenges of extending our understanding of hydraulic structures ranging from traditional to groundbreaking as well as designing constructing and managing safe durable hydraulic structures that are economical and environmentally friendly *Essentials of Hydraulics* Pierre Y. Julien,2022-05-19 Concise yet thorough look at hydraulics and hydraulic engineering Includes many worked examples case studies and end of chapter exercises River Mechanics Pierre Y. Julien,2018-04-12 Completely updated and with three new chapters this analysis of river dynamics is invaluable for advanced students researchers and practitioners

Flood Hazard Identification and Mitigation in Semi- and Arid Environments Richard H. French,Julianne J. Miller,2012 Alluvial fans are ubiquitous geomorphological features that occur throughout the world regardless of climate at the front of mountains as the result of erosion and deposition They are more prominent in semi and arid climates simply because of the lack of vegetative cover that masks their fan shapes in more humid areas From both engineering and geological viewpoints alluvial fans present particular fluvial and sedimentation hazards in semi and arid regions because episodic rainfall runoff events can result in debris mud and fluvial flows through complex and in some cases migratory channel systems Further in semi and arid climates alluvial fans often end in terminal or playa lakes Given the uniform topography of playa lakes these features often present ideal locations for facilities such as airports however regardless of the engineering advantages of the topography the episodic and often long term flooding of these lakes attracts migratory birds The purpose of this volume is to summarize the current state of the art from the viewpoint of engineering in the identification and mitigation of flood hazard on alluvial fans and to accomplish this a fundamental understanding of geology is required

Sediment Transport Silvia Susana Ginsberg,2011-04-26 Sediment transport is a book that covers a wide variety of subject matters It combines the personal and professional experience of the authors on solid particles transport and related problems whose expertise is focused in aqueous systems and in laboratory flumes This includes a series of chapters on hydrodynamics and their relationship with sediment transport and morphological development The different contributions deal with issues

such as the sediment transport modeling sediment dynamics in stream confluence or river diversion in meandering channels at interconnected tidal channels system changes in sediment transport under fine materials cohesive materials and ice cover environmental remediation of contaminated fine sediments This is an invaluable interdisciplinary textbook and an important contribution to the sediment transport field I strongly recommend this textbook to those in charge of conducting research on engineering issues or wishing to deal with equally important scientific problems

Treatise on Geomorphology

,2013-02-27 The changing focus and approach of geomorphic research suggests that the time is opportune for a summary of the state of discipline The number of peer reviewed papers published in geomorphic journals has grown steadily for more than two decades and more importantly the diversity of authors with respect to geographic location and disciplinary background geography geology ecology civil engineering computer science geographic information science and others has expanded dramatically As more good minds are drawn to geomorphology and the breadth of the peer reviewed literature grows an effective summary of contemporary geomorphic knowledge becomes increasingly difficult The fourteen volumes of this Treatise on Geomorphology will provide an important reference for users from undergraduate students looking for term paper topics to graduate students starting a literature review for their thesis work and professionals seeking a concise summary of a particular topic Information on the historical development of diverse topics within geomorphology provides context for ongoing research discussion of research strategies equipment and field methods laboratory experiments and numerical simulations reflect the multiple approaches to understanding Earth s surfaces and summaries of outstanding research questions highlight future challenges and suggest productive new avenues for research Our future ability to adapt to geomorphic changes in the critical zone very much hinges upon how well landform scientists comprehend the dynamics of Earth s diverse surfaces This Treatise on Geomorphology provides a useful synthesis of the state of the discipline as well as highlighting productive research directions that Educators and students researchers will find useful Geomorphology has advanced greatly in the last 10 years to become a very interdisciplinary field Undergraduate students looking for term paper topics to graduate students starting a literature review for their thesis work and professionals seeking a concise summary of a particular topic will find the answers they need in this broad reference work which has been designed and written to accommodate their diverse backgrounds and levels of understanding Editor in Chief Prof J F Shroder of the University of Nebraska at Omaha is past president of the QG G section of the Geological Society of America and present Trustee of the GSA Foundation while being well respected in the geomorphology research community and having won numerous awards in the field A host of noted international geomorphologists have contributed state of the art chapters to the work Readers can be guaranteed that every chapter in this extensive work has been critically reviewed for consistency and accuracy by the World expert Volume Editors and by the Editor in Chief himself No other reference work exists in the area of Geomorphology that offers the breadth and depth of information contained in this 14 volume masterpiece From the foundations and history of

geomorphology through to geomorphological innovations and computer modelling and the past and future states of landform science no stone has been left unturned **ASCE Manuals and Reports on Engineering Practice**, 2007 **Turbulent Open Channel Flow, Sediment Erosion and Sediment Transport** Clemens Chan-Braun, 2014-07-30 This thesis aims to contribute to a better understanding of turbulent open channel flow sediment erosion and sediment transport The thesis provides an analysis of high fidelity data from direct numerical simulation of i open channel flow over an array of fixed spheres ii open channel flow with mobile eroding spheres iii open channel flow with sediment transport of many mobile spheres An immersed boundary method is used to resolve the finite size particles Aquananotechnology David E.

Reisner, T. Pradeep, 2014-09-24 The world's fresh water supplies are dwindling rapidly even wastewater is now considered an asset By 2025 most of the world's population will be facing serious water stresses and shortages Aquananotechnology Global Prospects breaks new ground with its informative and innovative introduction of the application of nanotechnology to the remediation of contaminated water for drinking and industrial use It provides a comprehensive overview from a global perspective of the latest research and developments in the use of nanotechnology for water purification and desalination methods The book also covers approaches to remediation such as high surface area nanoscale media for adsorption of toxic species UV treatment of pathogens and regeneration of saturated media with applications in municipal water supplies produced water from fracking ballast water and more It also discusses membranes desalination sensing engineered polymers magnetic nanomaterials electrospun nanofibers photocatalysis endocrine disruptors and Al₁₃ clusters It explores physics based phenomena such as subcritical water and cavitation induced sonoluminescence and fog harvesting With contributions from experts in developed and developing countries including those with severe contamination such as China India and Pakistan the book's content spans a wide range of the subject areas that fall under the aquananotechnology banner either squarely or tangentially The book strongly emphasizes sorption media with broad application to a myriad of contaminants both geogenic and anthropogenic keeping in mind that it is not enough for water to be potable it must also be palatable

Erosion and Sedimentation Manual, 2006 NOTE NO FURTHER DISCOUNT FOR THIS PRINT PRODUCT OVERSTOCK SALE Significantly reduced list price while supplies last The Erosion and Sedimentation Manual provides a comprehensive coverage of subjects in nine chapters i.e. introduction erosion and reservoir sedimentation noncohesive sediment transport cohesive sediment transport sediment modeling for rivers and reservoirs sustainable development and use of reservoirs river process and restoration dam decommissioning and sediment management and reservoir surveys and data analysis Each chapter is self contained with cross references of subjects that are discussed in different chapters of this manual The manual also includes a list of commonly used notations used in the erosion and sedimentation literature conversion factors between the Imperial and metric units physical properties of water and author and subject indexes for easy reference Each chapter has a list of reference for readers who would like to seek out more detailed information on specific subjects Audience The

manual would be useful for researchers university professors graduate students geologists hydrographic survey analysts municipal and state water research specialists and engineers in solving erosion and sedimentation problems Related products Earth Science resources collection can be found here <https://bookstore.gpo.gov/catalog/science/technology/earth/science>

River Flow 2016 George Constantinescu, Marcelo Garcia, Dan Hanes, 2016-06-22 Understanding and being able to predict fluvial processes is one of the biggest challenges for hydraulics and environmental engineers hydrologists and other scientists interested in preserving and restoring the diverse functions of rivers The interactions among flow turbulence vegetation macroinvertebrates and other organisms as well as the transport and retention of particulate matter have important consequences on the ecological health of rivers Managing rivers in an ecologically friendly way is a major component of sustainable engineering design maintenance and restoration of ecological habitats To address these challenges a major focus of River Flow 2016 was to highlight the latest advances in experimental computational and theoretical approaches that can be used to deepen our understanding and capacity to predict flow and the associated fluid driven ecological processes anthropogenic influences sediment transport and morphodynamic processes River Flow 2016 was organized under the auspices of the Committee for Fluvial Hydraulics of the International Association for Hydro Environment Engineering and Research IAHR Since its first edition in 2002 the River Flow conference series has become the main international event focusing on river hydrodynamics sediment transport river engineering and restoration Some of the highlights of the 8th International Conference on Fluvial Hydraulics were to focus on inter disciplinary research involving among others ecological and biological aspects relevant to river flows and processes and to emphasize broader themes dealing with river sustainability River Flow 2016 contains the contributions presented during the regular sessions covering the main conference themes and the special sessions focusing on specific hot topics of river flow research and will be of interest to academics interested in hydraulics hydrology and environmental engineering

Modern Water Resources Engineering Lawrence K. Wang, Chih Ted Yang, 2014-01-11 The Handbook of Environmental Engineering series is an incredible collection of methodologies that study the effects of pollution and waste in their three basic forms gas solid and liquid This exciting new addition to the series Volume 15 Modern Water Resources Engineering has been designed to serve as a water resources engineering reference book as well as a supplemental textbook We hope and expect it will prove of equal high value to advanced undergraduate and graduate students to designers of water resources systems and to scientists and researchers A critical volume in the Handbook of Environmental Engineering series chapters employ methods of practical design and calculation illustrated by numerical examples include pertinent cost data whenever possible and explore in great detail the fundamental principles of the field Volume 15 Modern Water Resources Engineering provides information on some of the most innovative and ground breaking advances in the field today from a panel of esteemed experts

Sedimentology of Aqueous Systems Cristiano Poleto, Susanne M. Charlesworth, 2010-02-05 Sediments in aqueous

systems are of increasing interest to academics researchers practitioners and stakeholders around the world This book not only covers the characteristics of the sediments themselves but also their physico chemical impact on aquatic habitats and subsequent management implications There is a strong focus on methods and instrumentation for collecting data and monitoring of environmental sediment quality and as a result a wide range of environments are considered from urban areas to freshwater estuaries and marine ecosystems The chapters have been written by international specialists in the field ensuring a good breadth of examples experiences and case studies throughout This book will appeal to a broad spectrum of interests from geographers to engineers and environmental scientists and at undergraduate to post graduate and academic researcher levels

Geomorphic setting, aquatic habitat, and water-quality conditions of the Molalla River, Oregon, 2009-10 Kurt D. Carpenter, Christiana R. Czuba, Christopher S. Magirl, Mathieu D. Marineau, Steve

Sobieszczyk, Jonathan A. Czuba, Mackenzie K. Keith, 2012-02-29 This report presents results from a 2009 10 assessment of the lower half of the Molalla River The report describes the geomorphic setting and processes governing the physical layout of the river channel and evaluates changes in river geometry over the past several decades using analyses of aerial imagery and other quantitative techniques The peak flow hydrology in the Molalla River has been characterized by a series of large floods during the 1960s and 1970s a period of relatively small peak flows from 1975 to 1995 and a relative increase in severity of events in the past 15 years Although incomplete the gaging record for the early 20th century showed only modest high flows The flood chronology since 1960 has affected the geomorphology of the river corridor principally by increasing the active channel width The area affected by channel migration in the late 20th century however was reduced by the construction of revetments along the river corridor which acted to contain channel movement The study area along the Molalla River was divided into six unique geomorphic reaches The upper most reach designated GR6 is a narrow bedrock controlled reach with ample shade and large riffles The next downstream reach GR5 is also largely bedrock controlled but has a wider flood plain and active channel migration zone The longest geomorphic reach GR4 has a wide channel migration zone with many strategically placed revetments that work in concert with bounding bedrock to the northeast to suppress overall channel movement In contrast GR3 is a wide active reach that responds more dramatically to flood and non flood periods than the other geomorphic reaches The anthropogenically confined GR2 adjacent the City of Canby has relatively little historical channel movement and relatively few gravel bars Finally the farthest downstream reach GR1 is an actively meandering reach that most closely resembles its pre development state Detailed analysis of aerial imagery from 1994 2000 2005 and 2009 showed that channel migration activity and active channel widths were greater in GR3 than in any other geomorphic reach and were related directly to the timing and magnitude of high flows Similarly the revegetation of exposed bars is significant in GR3 and elsewhere when large floods do not occur A qualitative analysis of older aerial imagery dating back to 1936 showed that the recent channel migration activity in GR3 is no greater than it was historically Channel migration activity in

GR2 GR4 and GR5 was reduced relative to historical rates as a consequence of the construction of revetments and encroachment along the river corridor. Analyses of the longitudinal water surface profile first suggested a possible accumulation of alluvium in GR3 but subsequent analysis of the shape of the longitudinal profile juxtaposed against bedrock outcrops in the river channel showed that the river is largely flowing over a shelf of bedrock and not filling with sediment. Water quality benthic algae and benthic invertebrate conditions were examined during summer low flow periods to determine the overall health of the river and to provide possible insights into the physical or chemical influences on diatom assemblages. A wetter than normal spring in 2010 resulted in higher than normal flows in July and August that may have delayed the algal growing season and limited the accrual of algal biomass in the river. Longitudinal changes in water quality including downstream increases in water temperature and specific conductance were observed in the Molalla River during August and September. Such patterns are typical of many rivers receiving inputs from anthropogenic sources in the flood plain including agricultural and rural residential lands. Milk and Gribble Creek basins as well as some urban runoff in the lower river. Nutrient concentrations in the Molalla River were generally low at most sampling sites but did increase at the Goods Bridge and Knights Bridge sites presumably from a greater influence from anthropogenic sources that enter the river from tributaries, agricultural irrigation returns or groundwater in the lower basin. Nitrate concentrations at Glen Avon and Knights Bridges exceeded their respective reference values for streams in the Cascade Range and Willamette Valley. Although the nitrate nitrogen concentrations were somewhat elevated, phosphorus in contrast is relatively much less abundant in the Molalla River. N:P ratios for soluble biologically available nitrogen and phosphorus were lower in the upper middle reaches, less than 5, but the absolute concentrations of orthophosphorus, 0.010 milligrams per liter or less in July, suggest that attached periphytic algae in the river may be limited by phosphorus concentrations or some other factor but probably not by nitrogen. The Molalla River has lower phosphorus concentrations than other rivers draining the Cascade Range because the phosphate rich rocks of the Oregon High Cascades prevalent in other drainages are not present in the Molalla River basin which is wholly contained within the Western Cascade Range geologic province. The 2010 algal growing season was delayed due to an unusually cold and wet spring which produced streamflows 12-18 percent higher than normal in July and August and could have limited the accrual of periphyton biomass in the river. Nevertheless, a healthy biofilm of diatoms and other types of algae developed in the shallow riffle habitats during July, covering the entire stream channel in some areas. Generally, riffle habitats appeared healthy with little sediment and low substrate embeddedness; that is, the degree of infilling of fine sediments around gravels and cobbles was less than 5 percent at all sites except the Knights Bridge site where embeddedness was about 10 to 25 percent higher. Algal biomass levels in July were moderate, ranging from 30 to 55 mg of chlorophyll *a* per square meter, and the high densities of benthic macroinvertebrate grazers in the riffles suggests that the accumulation of algae biomass levels may have been limited by these herbivores. In August, however, a benthic bloom of

filamentous green algae *Cladophora glomerata* increased algal biomass in the lower river with nuisance levels at the Knights Bridge site. Higher nutrient concentrations both nitrate and orthophosphate combined with fewer invertebrate grazers mostly snails likely contributed to the higher biomass at this site. Long filaments of *Cladophora* also were observed in the area near the Canby drinking water treatment plant where in previous years algae have clogged water intakes during periods of senescence when algae detach from the river bed and enter the intake. In 2010 algal biomass conditions were not as severe and the intakes were not affected. Distinct fluctuations in concentrations of dissolved oxygen and in pH levels from algal photosynthesis were observed at all sites sampled with the largest diel changes and highest daily maximum values occurring at the two most downstream sites particularly at Knights Bridge. Although some relatively high pH values were measured as much as 8.4 units none of the pH measurements exceeded State of Oregon water quality standards even in the afternoon hours on warm sunny days. Dissolved oxygen concentrations at Goods Bridge and Knights Bridge did not meet the 8 milligrams per liter criteria in the early morning hours but compliance with the standards is only evaluated with 30 day average minimum values which were not available. Relative to the salmon spawning criteria for which the data collected during this study applies only to the Glen Avon Bridge site in September water temperature pH and concentrations of dissolved oxygen all met the state standard in effect. Thirty three species of algae were identified in the Molalla River including fast growing small diatoms and very large stalked diatoms filamentous green and blue greens and a few planktonic forms of green and blue green algae that may have washed into the river from an upstream pond. The occurrence of high biomass forming types of algae in the river including filamentous greens such as *Cladophora* and large stalked diatoms such as *Cymbella* and *Gomphonema* could be a concern for fish populations because of the potential for smothering fish redds or by impacting benthic invertebrate populations that feed fish. Together most of these algae and overall algal biomass are typical of generally high quality waters with little organic pollution high concentrations of dissolved oxygen and alkaline pH. The relatively high percentage of eutrophic taxa does however suggest some degree of nutrient enrichment in the river despite the relatively low concentrations observed at most sites. Uptake of dissolved nutrients by algae and inputs of additional nutrients complicates interpretations regarding nutrient concentrations in the river especially because samples were collected during summer growing season. Although the bulk of the diatom species generally were similar among at least the four upstream sampling sites the multivariate ordination suggests a downstream trend in assemblage structure from the Glen Avon Bridge site to the Highway 213 Bridge. The next downstream site at Goods Bridge near the downstream end of the alluvial GR3 reach however plotted closer to the most upstream site at Glen Avon Bridge which indicates a change in assemblage structure. The algal indicator species analysis showed a change in species composition at the Goods Bridge site including decreases in eutrophic diatoms increases in the relative abundance of oligotrophic diatoms and an increase in diatoms sensitive to organic pollution that suggests an improvement in water quality conditions. Although this may be related

to the enhanced water exchange into and out of the streambed in the alluvial reach and such hyporheic activity could work to clean the river of organic compounds and nutrients. Small decreases in water quality, lower concentration of dissolved oxygen and higher conductance and nutrient concentrations were observed between the Highway 213 and Goods Bridge sites. The multivariate analysis relating the diatom species composition data to the geomorphic and water quality variables indicated that the presence of local gravel bars, bedrock exposure to the sun, open canopy and pH had a significant role in shaping the diatom assemblage structure. Although there was a high percentage of similarity among samples, many of these factors have the potential to affect diatoms and other algae through various interrelated mechanisms that relate to channel mobility and associated effects on light available for algal photosynthesis, for example, and other potential factors. Although only qualitatively addressed for this study, benthic macroinvertebrates including mayflies, caddisflies and stoneflies were abundant in the Molalla River and indicate a high degree of secondary production in the riffles throughout the study reach. Snails, another voracious grazer of algae, also were relatively abundant at the Goods Bridge and Knights Bridge sites. Additionally, large numbers of the large caddisfly larvae *Dicosmoecus* were observed throughout most of the lower river in a range of depths and habitats. The large densities of these grazers combined with the moderate level of algal biomass suggest that invertebrate grazers could have limited the accrual of algae during summer 2010, an assertion that could be evaluated with further study. In northern California's Eel River, high abundances of *Dicosmoecus* were detected in summers following winters that lacked bankfull flow, as was the case for the Molalla River in water year 2010. The lack of disturbance might explain the high abundance of these herbivores in the Molalla River. The information from this study can be used to adapt management strategies for the Molalla River and its flood plain. These strategies may assist in developing and maintaining a healthy river environment that includes high quality water for aquatic life and human consumption.

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