



Watershed Systems

Hydrology - Geology - Soil Science

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Thomas Lippe
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Dear Mr. Lippe,

You have asked that I address the specific hydrologic and sediment issues that may be associated with program implementation for the **Napa River Watershed Sediment TMDL and Habitat Enhancement Plan**. These are the issues that are the focus of pp 93-120 in the Staff Report for current version of the proposed Napa River TMDL. I had not noticed that the checklist format and abbreviated discussion of impacts of the implementation program itself did not really address the environmental impact of the proposed actions. That section of the staff report conveys an impression that the Napa County regulations that govern land use conversions to vineyards in the hillside areas of Napa County will meet the goals of the TMDL with State Board oversight as proposed in the TMDL implementation plan.

However, my prior extensive reports and analyses of specific conversion projects in Napa County have all demonstrated that you cannot simultaneously reduce sediment yield with engineering structures and flow routing while maintaining or reducing peak flow runoff. The belief that the proposed TMDLs will meet or exceed water quality standards when implementation of the TMDL must rely on land use regulations that are not within the control of the Regional Board needs to be reconsidered. In my opinion, it may be possible to implement the TMDL and meet its goals with local control, but that has not been demonstrated to date and the bulk of the evidence suggests that in the specific case of Napa County, there is an entire land-use engineering industry that has not been able to deal with impacts of peak flow increases associated with land conversions.

The source-area erosion control technology promoted by the consultant community in Napa County is good and seems to be improving through time. But the engineering solutions for headwater source-area sediment yield reduction and/or local capture of sediments almost invariably result in greater off-site, downstream, concentration of runoff that then leads to bank and streambed erosion to balance sediment load with the increased stream power. It seems that recommendations for more and larger-capacity on-site runoff detention are largely ignored in favor of reduced sediment concentration in that runoff.

This is understandable. It is more expensive in terms of money and land resources to capture and recharge the volumes of water that are yielded with a land use conversion from native vegetation to vineyard than it is to control sediment yield. The consulting reports done for Napa County to meet their Erosion Control Ordinance requirements almost always utilize the Natural Resource Conservation Service's older Soil Conservation Service map soil unit characteristics as the basis for calculating comparative before- and after- yields of sediment and water that are to result from a proposed land conversion. By using the broad scale map unit soil descriptions for the sites as they existed in the 1960's and 1970's before conversion, consultants are able to show to the satisfaction of Napa County Planning staff and its Rural Conservation District that a proposed conversion will either not increase runoff at all, while capturing sediment, or will not have a significant environmental impact on the channels or watercourses of the conversion site.

As I have repeatedly pointed out to Napa County in my reviews of Erosion Control Plans, most vineyard conversions significantly change the hydrologic characteristics of the soil substrate in the new vineyard areas. The single most important factor in this change is the removal of surface stones and/or deep-ripping of soils on hillsides. Either of these common vineyard preparation activities changes the porosity and permeability of surface soils, sometimes in ways that increase runoff for a given high-intensity storm event. When these changes are coupled with constructed lined drainage ditches, culverts, and other erosion control structures, the net result is an increased rate of runoff for higher intensity storms.

What is critical for the proposed TMDL is an appreciation the fact that most of the deleterious land use activities that affect water quality do so only infrequently. The average year's rainfall is not a significant geomorphic agent of erosion. The mean annual channel flood does not significantly alter the banks and bed of that channel. It is the 15-30 year interval intensity-duration rainfall events that wipe our fisheries, erode channel banks, move gravel bars, and flood the surrounding country side. A cover-crop of grasses planted in a vineyard to compensate for leafless vines that have replaced native chaparral cannot emulate the pre-conversion hydrologic characteristics.

Despite the great and sincere research efforts that went into this TMDL, the significant differences in impacts of conversion of stony east-side Napa Valley chaparral-covered hillsides to vineyard are not the same as those when oaks and other trees are cleared from some geologic substrates on the west side or southern foothills of the County. Until and unless the County Planners can demonstrate that they understand how to balance both sediment yield and water yield to minimize offsite, downstream impacts, the "checklist" included in the Staff Report on pp. 100-101 dealing with hydrology and water quality cannot be considered accurate.

For example: Section VII: Would the Project – c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion of siltation on- or off-site?

Yes, most certainly! Yet "less than significant impact" is checked. Presumably, "of" siltation is a typographic error and should be "or" siltation. The *project* is the *action* of the TMDL to implement its requirements through continued use of Napa County Erosion Control Plans. Yet we have repeatedly shown that these plans underestimate off-site

channel erosion and often underestimate on-site erosion for geomorphically-significant expected storm events.

Part d asks: d) Would the Project: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Again "less than significant impact" is checked. Yet the existing practice of the Erosion Control Plans approved by Napa County to recommend engineered drains and extensive collector systems to prevent on-site erosion in the vineyards and their vineyard roads does in-fact speed and concentrate runoff that is then discharged off-site into tributary ephemeral and intermittent stream courses from which it is carried to the Napa River.

The fact that "reasonably foreseeable compliance projects" are listed to include earthmoving and minor construction does not address the environmental impact of these "foreseeable compliance projects". We are told, [Section VIII, part c] *Specific projects involving earthmoving or construction activities to comply with requirements derived from the proposed Basin Plan amendment are reasonably foreseeable. Such projects could affect existing drainage patterns. However, to meet proposed Basin Plan amendment allocations, they would be designed to reduce overall soil erosion, not increase it. Nevertheless, temporary earthmoving operations could result in short-term, limited erosion. These specific compliance projects would be subject to the review and/or approval of the Water Board, which would require implementation of routine and standard erosion control best management practices and proper construction site management. In addition, construction projects over one acre in size would require a general construction National Pollutant Discharge Elimination System permit and implementation of a storm water pollution prevention plan. Therefore, the Basin Plan amendment would not result in substantial erosion, and its impacts would be less-than significant.* [Staff Report, pp 113-114]

But the reduction of soil erosion does not offset increased off-site peak flow increases. You can reduce soil erosion on the hillslope while simultaneously increasing it along the channels downstream. These are difficult issues to resolve and require very thorough and continuing diligence. This is the nexus of a cumulative hydrologic effect. The recommended structural drainage facilities such as culverts, lined ditches, and drainage channels as applied over large areas of Napa Valley will reduce sediment input from uplands but will exacerbate off-site channel and stream-bed erosion through increased yield of runoff. The public and the fish in the Napa River are directly impacted by the cumulative downstream impacts of increased frequency and duration of flood flows in the main river and its primary tributaries. The sediment addressed by the TMDL is also important but cumulative effects analyses must also include the changed flow characteristics.

Respectfully Submitted:



Robert R. Curry, Registered Geologist

CURRICULUM VITA

Robert R. Curry

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Research Specialties:

Fluvial Geomorphology, Wetlands and Stream Restoration, Wetland Delineation, Watershed Systems, Land and Habitat Restoration

1. EDUCATION

PhD: University of California, Berkeley, Department of Geology & Geophysics, 1967 in Geomorphology & Paleoclimatology

2. PROFESSIONAL –REGISTRATION *Registered Geologist California #3258*

3. CONTEMPORARY ACTIVITIES

1982-present: Estuarine and freshwater stream restoration projects. Primary research with students on restoration of damaged estuarine ecosystems. Pescadero Marsh Management Plan study for California Dept. of Parks and Recreation. Schwan Lake restoration plan, 1991-95. San Lorenzo river restoration planning, 1986-96; Lahontan Regional Water Quality Control Board regional wetland restoration 1991-ff., 1998-ff San Mateo and Santa Barbara Counties with L.C. Lee & Assoc; 1999-2002 Salinas River and Carmel Valley TMDL Sediment/Salmonid studies with Regional Board and CDF&G.

4. Selected PUBLICATIONS

7.1. -Books and Monographs

- (1) Curry, R.R., and Wahrhaftig, Clyde, 1967, Geologic Implications of Sediment Discharge from the Northern Coast Ranges, California; p. 35-60 in Goldman, C.R., (ed), *Man's Effect on California Watersheds*, Section 3; Inst. of Ecology, University of California, Davis, Calif. 434 p.
- (3) Curry, R.R., 1968, Quaternary Climatic and Glacial History of the Sierra Nevada, California; Univ. Microfilms 68-13,896; Ann Arbor, Mich., 238 p. (PhD thesis, University of California, Dept. of Geology and Geophysics, 1968).

- (4) Curry, R.R., 1969, Holocene Climatic and Glacial History of the Central Sierra Nevada, p. 1-47, Special Paper 123, Geol. Soc. America.
- (7) Curry, R.R., 1971, Glacial and Pleistocene History of the Mammoth Lakes Sierra: Univ. Montana, Dept. Geology, Geol Series Publ. 2, 50 pp + map.
- (18) Burke, Mary T., R. Curry, J. Major, and D. Taylor, 1982, Natural Landmarks of the Sierra Nevada. U.S. Dept. Interior, National Park Service, Conservation and Recreational Services Division. Landmark Survey of the Sierra Nevada, 529 p.
- (20) Kondolf, G.M., John Williams, and R. R. Curry, 1983, Channel Stability and Fish Habitat, Carmel River, California. Field Conference Guidebook for Symposium and Field Conference, Monterey Peninsula College, Monterey, Calif. June 16-18, Monterey Peninsula Water Management District, 76 p.
- (21) Curry, R. R., 1985, Sedimentologic and Hydrologic Analysis of Pescadero Marsh and its Watershed. Report to State of California, Dept. of Parks and Recreation, 110 pp.
- (22) Curry, R. R., and A. Beth Dyer (eds), 1992, The current status of Schwan Lagoon, Santa Cruz County, California and some management considerations. A compilation of technical reports. Univ. of California Santa Cruz, 96 p.

7.2. -Selected Journal and web papers and book chapters

- (2) Curry, R.R., and Clyde Wahrhaftig, 1966, Geologic Implications of Sediment Discharge Records from the Northern Coast Ranges, California. Report to the California state Assembly Committee on Natural Resources, Planning, and Public Works; Sub-committee on Forest Practices and Watershed Management, August, Sacramento, Calif., 22 p.
- (20) Curry, R.R., 1970, A proposal for ecological refugia: Intecol Bulletin, v. 1, p. 3-7.
- (22) Curry, R.R., 1971, Soil destruction associated with forest management and prospects for recovery in geologic time: Assoc. Southeastern Biologists Bull. v. 18, no. 3, p 117-128.
- (27) Curry, R.R., 1973, Reclamation of Arid Western Lands: Montana Outdoors, v. 4, no. 3, p 18.
- (31) Curry, R.R., 1975, Practices and problems of land reclamation in western North America: Biogeochemical limitations on western reclamation—the high Northern Great Plains example. p. 18-47 *in*: Wali, M.K. (ed), Practices and Problems of Land Reclamation in western North America, Univ. North Dakota Press, Grand Forks, 196 p.
- (32) Curry, R.R., 1976, Downstream effects of runoff changes, p. 251-262 *in*: Sharma, Raj, D. Buffington, and J. McFadden (eds), Proceedings of the workshop on biological significance, Argonne National Laboratories. U.S. Nuclear Regulatory Comm., NR-CONF-002, Wash. D.C., 327 p.
- (36) Curry, R.R., 1977, Watershed form and process: The elegant balance. p. 14-21 *in*: CoEvolution Quarterly, winter 1976-77.
- (39) Curry, R.R., 1977, Watershed Systems and Policy Planning, p. 47-61 *in*: Inst. for Policy Studies, Portland State University, Water for Oregon's Future, Inst. for Policy Studies, Portland, 144 p.
- (47) Curry, R. R., 1981, Watershed Form and Process: The Elegant Balance. Chapt 20 (p. 319-340) *in* Emery, F.E. (ed), "Systems Thinking", Vol. 2, Penguin Books, Middlesex, England, 474 p. Penguin Modern Management Readings, Education Series, published simultaneously by Penguin Books, New York; Victoria, Australia; Markham, Ontario, Canada; and Auckland, New Zealand.

- (49) Curry, R.R., and G.M. Kondolf. 1981. Strategy for restoration of channel stability, Carmel River, Monterey County, CA. in *Watershed Rehabilitation in Redwood National Park and Other Pacific Coastal Areas*. Proceedings of a Symposium, August 24-28, 1981. Arcata, California. pp. 191-208.
- (50) Kondolf, G. M., and R. R. Curry, 1984, Role of Riparian Vegetation in stream channel equilibrium: The Carmel River Example, Monterey County, California. pp. 124 - 133 in Warner, R.E. and K.M. Hendrix (eds), *California Riparian Systems*, Univ. Calif. Press, Los Angeles.
- (51) Curry, R.R. and W. Oechel, 1984, Shrubland Ecosystem Dynamics, Chapt 8, p. 98-103, in J.J. deVries (ed), *Shrublands in California: Literature Review and Research Needed for Management*. Water Resources Center, Univ. of California, Davis, Calif., June, 1984.
- (52) Kondolf, G.M., and R.R. Curry, 1986, Channel Erosion along the Carmel River, Monterey Co., Calif. *Earth Surface Processes and Landforms*, v. 11,, no. 3, pp. 307-319.
- (53) Curry, R.R., 1987, Water quality protection in forest management: Are Best Management Practices working?, pp. 55-61 in Callaham, R.Z., and J.J. DeVries (eds), *Proceed. of the California Watershed Management Conference*, Nov. 18-20, Sacramento, Calif. Wildland Resources Center, Univ. Calif., Berkeley, Rept. 11, 167 p.
- (54) Curry, R. R., 1992, Eastern Sierra Nevada Wetland Assessment: Bridgeport Basin Study Site—Climatic change, irrigation, and wetland boundaries. pp 396-414 in *The History of Water— White Mountain Research Station Symposium Volume 4*, Clarence A. Hall, Jr., et al (eds), University of California White Mountain Research Station, Los Angeles, Calif., 453 p.
- (55) Curry, R.R., 1999, Science Review: Sierra Nevada Ecosystem Project. Pp. 321-325 in: *Bioregional Assessments: Science at the Crossroads of Management and Policy*, N.K. Johnson, et al, (eds) Island Press, Wash. D.C., 398 p
- (56) Curry, R.R. 1999, Pacific Lumber Company proposed Habitat Conservation Plan and Sustained Yield Plan Draft EIR technical review. http://www.wildcalifornia.org/pages/hcp_review.html 19 p
- (57) Fred Watson, Bob Curry, Scott Hennessy, Wendi Newman, Thor Anderson, Lars Pierce, Joel Casagrande, Julie Hager, Don Kozlowski, Alana Oakins, Bronwyn Feikert, Joy Larson, Brian Londquist, Wright Cole, Adrian Rocha. (2000). The Salinas Sediment Study - a hands on, research and community-based approach to TMDL development. Oral presentation and Proceedings. 8th Biennial Watershed Management Council conference, Nov. 27-30, Asilmoar Beach, California, USA.
- (58) Thor Anderson, Wendi Newman, Fred Watson, Adrian Rocha, Don Kozlowski, Joel Casagrande, Alana Oakins, Julie Hager, Wright Cole, Bob Curry. Sediment in furrows, farms, and forests – multi-scale measurements for multi-scale modelling and management. Poster presentation and abstract, AGU Fall Meeting 2000.
- (59) W. Newman, T. Anderson, F. Watson, R. Curry, S. Hennessy, L. Pierce, J. Casagrande, J. Hager, D. Kozlowski, A. Oakins, B. Feikert, J. Larson, B. Londquist, W. Cole, A. Rocha. (2000). The Salinas Sediment Study - the challenge of monitoring just about everything in a watershed where we know just about nothing. Poster presentation. 8th Biennial Watershed Management Council conference, Nov. 27-30, Asilmoar Beach, California, USA.
- (60) Watson, F., Newman, W., Anderson, T., Casagrande, J., Hager, J. Kozlowski, D., Rocha, A., Oakins, A., Feikert, B., Cole, W., Londquist, B., Curry, R., Hennessy, S., Pierce, L., & Angelo, M. 2001, *The Salinas Sediment Study*. Report to the Central Coast Regional Water Quality Control Board, San Luis Obispo, California.

Watershed Institute, California State University Monterey Bay, Seaside, California, USA.

7.3. -Selected Professional Reports to Public Agencies

- (1) Curry, R.R., 1972, Geologic report for Baca Land and Cattle Co., vs. New Mexico Timber Co.; Valles Caldera, New Mexico: For Dunnigan Enterprises, Inc., Abilene, Texas. On impacts of timber removal from prospective National Park site.
- (9) Curry, R.R., 1973, Hazard geology and soils of the proposed Sherwin Bowl ski area, Mono Co., Calif. For: U.S. Forest Service, Inyo N.F.
- (14) Curry, R.R., 1974-1975, Geologic considerations of location of U.S. 395 near Sherwin Summit, Mono County, Calif. For: Caltrans on protection of geologic locality to be impacted by highway construction.
- (19) Curry, R.R., 1974, Geologic Hazards and Planning Considerations for the June Lake Loop Area, Mono County, Calif. -General Plan Safety Element for: Ingmire-Patri land planners, through Sodway-Cooke, San Francisco, To the U.S. Forest Service - contracted report of about 100+ pp. + appendices. Incorporated into the initial June Lake Loop General Plan, Mono Co., Calif.
- (20) Curry, R.R., 1977, Contribution to report of the U.S. Fish and Wildlife Service, Western Energy and Land Use Team report: Clarification and standardization of the definition, purpose, and practice of ecological baseline studies in western energy development areas. Ecological Consultants, Inc. Ft. Collins, Colo. I served as advisor to USFWS on this study.
- (30) Keller, E.A., R.R. Curry, and Paul Seidleman, 1982, Watershed Rehabilitation in Redwood National Park: A Critical Evaluation. Center for Natural Resource Studies, Berkeley, Calif.
- (31) Curry, R.R., 1986-88, Calif. Dept. of Parks and Recreation, Pescadero Lagoon and Pescadero Creek management problems. Technical review and input to management plan based upon my 1985 report. San Mateo County.
- (32) Curry, R.R., 1986-87, Sierra Club and others; technical reviewer for environmental assessment of Barstow to Las Vegas off-road vehicle races. Written original field-based analysis and evaluation of Bureau of Land Management's analysis.
- (33) Emery, Brett, and R.R. Curry, 1988, Mono County Planning Commission "Natural Resources Inventory, Mono County, Calif." with student Brett Emery, 25 pp report and public presentation to accompany Mr. Emery's field based senior thesis.
- (34) Curry, R.R., 1992, Final Report, Bridgeport Wetland Delineation, 36 pp + map, to Mono County and Lahontan Regional Water Quality Control Board.
- (35) Curry, R.R., 1993, Identification and Location of Beneficial Uses of Wetlands; 200+ pp + 1000+ maps + database. To: Lahontan Regional Water Quality Control Board.
- (36) Curry, R.R., C.E. Christian and B.E. Emery, 1996, Mono County, California delineation of certain wetlands and policy recommendations for site-specific restoration mitigation banking. To: Lahontan Regional Water Quality Control Board, 50 pp + maps and data sheets.
- (37) Curry, R. R., B. Emery, and C. Christian. 1996. Development of specific plans and policies to avoid or mitigate the impacts of future development in certain Mono County wetlands. Final Report prepared for the California Regional Water Quality Control Board, Lahontan Region. Contract No. 4-075-160-0, derived from U. S. Environmental Protection Agency Assistance Agreement.
- (38) Smith, Douglas; Curry, Robert, et al, 2002, Watershed and Riparian Assessment Report (WRAR): Bureau of Land Management, Fort Ord, Monterey County, California, 85 p.