



EXHIBIT 3-A
Division of Science & Environmental Policy
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2018 Carmel River Cross Section Survey and Large Wood Inventory

From: Dr. Douglas Smith (CSUMB School of Natural Sciences)

To: Larry Hampson (Monterey Peninsula Water Management District)

Overview

San Clemente Dam was removed in 2015. We propose to document geomorphic changes and shifts in sediment size distributions in the third winter runoff following dam removal. We will use benchmarked cross sections and bed material particle counts to collect the data.

The dam removal project is unique in the world because it was designed to produce *de minimis* negative impacts to the downstream reach of river, while providing the ecological benefits of fish passage, restoration of steelhead spawning gravel, and the safety benefits of dam removal (Blanco et al., 2013; Boughton et al., 2016). However, the reintroduction of coarse sediment to the lower Carmel River (from the dam to the coast) can also locally influence flood hazard through channel filling bar formation and floodplain aggradation. Further, bar formation can force flows against stream banks, leading to accelerated erosion of public and private property.

CSUMB established 40 benchmarked river cross sections to monitor the changes in the river related to dam removal. We periodically collect topographic data and perform grain size analysis on the Carmel River (e.g., Leiker et al 2014; Chow et al. 2016a; 2017; Steinmetz and Smith 2018a). The work to date has shown that a small, pool-filling sediment wave of sand and fine gravel prograded just 3.5 km downstream from the dam site in the first post-dam winter (Chow et al. 2016a), and virtually no cross sectional changes were noted. In the second year (water year 2017), high flows eroded a large volume of sediment from above the dam site and deposited it throughout the lower Carmel River, to the coast. The resulting significant cross sectional changes and changes to sediment size were reported in Steinmetz and Smith (2018a) and Harrison et al (in press 2018). Much of the lower river was blanketed in sand and small gravel, leaving fewer opportunities for steelhead spawning in the lower river than existed before the dam removal. While spawning-sized gravel was introduced to the lower river, it is clear that subsequent flows will be needed to winnow the fine sediment, if the high quality gravel will be utilized by spawners. The proposed work will continue monitoring the river to document the changes driven by the average flows of water year 2018.

This proposal is to fund the third post-dam removal surveys that will document any changes resulting from the somewhat modest flows of winter 2018.

The impacts (or lack of impacts) documented by this project will inform the MPWMD and Carmel Valley residents about continual change (or stability) present in the Carmel River channel.

Deliverables

The deliverables will include one final report and associated data in spreadsheet format. The cross section report will include data for approximately 40 cross sections spanning from below Los Padres Dam to the Crossroads shopping center. The report will include the following sections:

- 1) Project background
- 2) Data collection methods
- 3) Presentation of cross section and grainsize analyses in graphs and summary data tables
- 4) Comparison with previous data sets to analyze change occurring before dam removal and as a result of dam removal
- 5) Well organized and annotated data spreadsheet.

Budget

We propose to complete the work for \$21,495, a summary budget is included. All survey equipment will be provided by the CSUMB Watershed Geology Lab.

We propose to complete the fieldwork fall of 2018 before significant runoff of 2019 water year impedes access to the channel. Reports will be completed before February 2019. Work on this project is contingent upon contracting between the MPWMD and the University Corporation at Monterey Bay.



Dr. Douglas Smith, Professor
Division of Science and Environmental Policy

References

- Beck E, Geisler E, Gehrke M, Goodmansen A, Leiker S, Phillips S, Rhodes J, Schat A, Snyder A, Teaby A, Urness J, Wright D., Smith, D. 2013. A Survey of Large Wood on the Carmel River: Implications for Bridge Safety Following San Clemente Dam Removal: The Watershed Institute, California State Monterey Bay, Publication No. WI-2013-04, 46 pp.
http://ccows.csUMB.edu/pubs/reports/CSUMB_ENVS660_ClassReport_CarmelWood_131002.pdf
- Blanco, S., Bohlke, B., Crawford, C., David, C., Delay, T., Keefauver, S., Miller, G., Perkins, P., Petruccelli, S., Post, K., Silveus, J., & Smith, D. 2012. San Clemente Dam Removal and Carmel River Reroute Monitoring Plan: Carmel, CA. The Watershed Institute, California State Monterey Bay, Publication No. WI-2012-05, 93 pp.
http://ccows.csUMB.edu/pubs/proj_pubs/2012/ENVS660_Carmel_Monitoring/CSUMB_ENVS660_ClassReport_DamRemovalMonitoring_121128.pdf
- Boughton DA, East A, Hampston L, Kiernan J, Leiker S, Mantua N, Nicol C, Smith D, Urquhart K, Williams T, Harrison L. 2016. Removing a dam and re-routing a river: Will expected benefits for steelhead materialize in Carmel River, California? NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-553. US Department of Commerce. Southwest Fisheries Science Center, Santa Cruz, CA. 89 pp.
<https://swfsc.noaa.gov/publications/TM/SWFSC/NOAA-TM-NMFS-SWFSC-553.pdf>
- Chow K., Luna L., and Smith D. 2017. 2016 Post-San Clemente Dam Removal Morphological Monitoring of the Carmel River Channel in Monterey County, California. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2017-01, 58 pp.
http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelRiverGeomorph2016_1703301.pdf
- Chow K, Fields J, Flores S, Hart K, Kleven A, Luna L, MacCarter L, and Smith D. 2016(a). San Clemente Dam Removal Sediment Impacts: Year One Report. Watershed Institute, California State University Monterey Bay, Publication No. WI-2016-10, 38 pp.
- Chow K., Luna L., Delforge A. and Smith D. 2016(b). 2015 Pre-San Clemente Dam Removal Morphological Monitoring of the Carmel River Channel in Monterey County, California. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2016-01, 50 pp.
http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelRiverGeomorph2015_160128a.pdf
- Harrison, L.R., East, A.E., Smith, D.P., Logan, J.B., Bond, R., Nicol, C., Williams, T.H., Boughton, D.A., Chow, K. and Luna, L. 2018. River response to large-dam removal in a Mediterranean hydroclimatic setting: Carmel River, California, USA. In press Earth Surface Processes and Landforms.
- Leiker S, Delforge A, Geisler E, Smith D. 2014. Pre-San Clemente Dam Removal Morphological Monitoring of the Carmel River Channel in Monterey County, California. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2014-07, 32 pp.

MacCarter L, Fields J, Smith DP. 2017. Large Woody Debris on the Carmel River from the Dam Keeper’s House to Carmel Lagoon, Fall 2016: Watershed Institute, California State University Monterey Bay, Publication No. WI-2017-03, 27 pp. http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelLWD_2016Report_170307a.pdf

MacCarter, L., Fields, J., Smith, D.P. 2016. Large Woody Debris on the Carmel River from Camp Steffani to the Carmel Lagoon, Fall 2015: Watershed Institute, California State University Monterey Bay, Publication No. WI-2016-05, 25 pp. http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelLWD_2015Report_160228.pdf

Steinmetz C. and Smith D. 2018a. 2017 Post-San Clemente Dam Removal Morphological Monitoring of the Carmel River Channel in Monterey County, California. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2018-03, 51 pp. http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelRiverGeomorph2017_180211.pdf

Steinmetz, C. and Smith DP. 2018b. Large Woody Debris on the Carmel River from the Former Dam Keeper's House to Carmel Lagoon, Fall 2017: Watershed Institute, California State University Monterey Bay, Publication No. WI-2018-02, 27 pp. http://ccows.csUMB.edu/pubs/reports/CCoWS_CarmelLWD_2017Report_180211.pdf

Budget Items Requested	Year 1 Budget
A. Direct Costs:	
1. Salaries & Wages (professional & clerical employees, temporary and student support, etc.)	\$ 15,050
2. Fringe Benefits	\$ 1,370
3. Materials and Supplies	\$ 300
4. Other (telephone, subscriptions, service vehicle)	\$ 1,568
Total Direct Costs (add 1-10 above):	\$ 18,288.00
B. Indirect/Administrative Costs: 20%	
	\$ 3,658
TOTAL PROJECT FUNDS:	\$ 21,945

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