



5 January 2009

Melanie Powers, Technical Coordinator  
CABY IRWMP  
1545 Shirland Tract  
Auburn, California 95603

**RE: *Response to Request for Proposal to Prepare a Watershed Assessment of Western Placer Creeks***

Dear Ms. Powers:

The ECORP/Balance Project Team [ECORP Consulting, Inc. (ECORP, as prime) and Balance Hydrologics, Inc. (Balance)] is pleased to submit this *Response to Request for Proposal to Prepare a Watershed Assessment of Western Placer Creeks*. We have assembled an excellent team of aquatic biologists, environmental scientists, and water resource engineers from both firms to fulfill the obligations of CABY's solicitation. Together, our firms' collective expertise is complementary. ECORP's in-house team of aquatic and terrestrial biologists, geomorphologists, hydrologists, and permitting specialists, is joined by Balance's fish passage engineers and specialists in surface/groundwater hydrology, sediment transport, and geomorphology.

We recognize that CABY seeks to develop a true regional restoration framework. Both firms share that vision. We understand that such a framework needs (a) consistency of information amongst the watersheds, (b) judgment of experienced senior staff to rationalize and make consistent information collected by different entities using varied classification and protocols, and (c) and willingness to efficiently collect primary data where and how needed, then integrate it into a regional information base. We also realize that these experienced staff should have a bonafide interest in listening – to the collective and individual wisdoms inherent in the TAG; to CABY staff who seek to guide, fund, and communicate the results, and to agency staff at all levels charged with integrating the results with their own plans and implementing actual on-the-ground projects. Similarly, we understand the importance of presenting results, once reviewed and shaped by the TAG, in formats allowing projects to be 'shovel-ready' as soon as possible following TAG's recommendations for adoption of programs.

Accordingly, we have taken the unusual step of staffing this project *primarily with senior professionals*, who can provide the experience, judgment, and listening abilities that will be needed to unify a disparate group of data sets and to work with CABY and its cooperators to develop, internally criticize and prioritize, then complete and implement the type of program that you seek. In selecting the senior professionals to staff this team, we have further emphasized those that (a) understand, and believe in (to the extent that they have records of volunteering time with) regional watershed planning; (b) have an affinity for technically-complex, consensus-based plans, and (c) have experience with unifying or repairing data sets collected by a range of state, federal, and local agencies, from upland USFS data to lowland Reclamation Board or Water Rights Division files<sup>1</sup>, and (d) records of communicating well over extended periods.

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<sup>1</sup> Relatedly, our technical proposal notes that many of our results will be expressed per guidances used by these agencies.

We recognize that CABY will make a consultant selection prior to arranging for funding or for sponsorship by the key agencies that will abet program implementation. This, too, is an unusual step, and it is one that makes sense to the two firms. Our response is three-fold:

1. We recognize that completing this program may take longer than expected; therefore, we have given you a proposal amenable to phasing or disaggregation as funding and sponsorship comes available.
2. We know that having consulting-staff continuity is especially important in such cases, so have also taken a step that we consider critical – assigning senior staff *with long tenures in our firms or in the region*, believing it more likely that such staff will be around to help complete the project.<sup>2</sup>
3. We understand the value of helping you fund and shape the ultimate work program, and look forward to sharing this load, as functional and appropriate.

Finally, we have proposed a new task to consider the vulnerability of the waterways to anticipated future changes in land or water use. We propose this in the hopes that it will help you apply projected land uses or factors affecting low and high flows in the planning process. Our staff have learned, as well, that the best plans also incorporate provisions for droughts or other episodic events – such as post-wildfire pulses of water and sediment – which would be incorporated during this task. We have proposed this task as an initial effort in Phase II, but it could just as easily fit at the end of Phase I.

The proposed Project Team organization is intended to be simple and allow us to optimize these considerations. We propose that ECORP serve as the prime consultant with Mr. Thomas Keegan, Director of ECORP's Aquatic Resource Group, serving as the Program Manager. Tom's expertise in fisheries biology, aquatic ecology, steelhead and Chinook salmon passage, agency liaison, and collaborative/public facilitation meets these challenges. He has in-depth knowledge of the regional (i.e., West Placer County) aquatic ecological issues, and in particular, anadromous and resident salmonid issues. He is the Study Manager for the US Army Corps of Engineers San Francisco Bay Salmonid Tagging study, which includes a consortium of several state and federal agencies, and water districts who are inserting acoustic tags into steelhead and late fall run Chinook salmon smolts, and tracking their outmigration throughout central valley rivers, including the American River and Yuba River. In addition, Mr. Keegan's expertise includes fish passage and restoration planning, and mitigation/compliance monitoring for most northern California special-status fish species.

Mr. Keegan is supported by Mr. Bill Christner, ECORP's Project Manager, who will oversee daily operations concerning ECORP's staff and technical expertise in fisheries and aquatic habitat assessments, fluvial geomorphology, restoration design and planning, and regulatory issues. Mr. Chris White, principal for water-quality and wetlands assessment at Balance's Auburn office, will direct its work and serve as its point of contact, as well as bringing his wide experience with nutrient and metals issues to bear. He will also draw upon the firm's array of watershed specialists in its Truckee and Berkeley offices, aided by Mr. Barry Hecht, Balance's Senior Principal, a nationally-recognized expert in watershed assessment hydrology. Balance's staff of hydrologists and engineers offers bonafide surface/ground-water interaction, sediment-transport, and extensive engineering expertise in fish passage design development, design plan specifications, costing, hydrologic modeling, and construction oversight.<sup>3</sup> Mr. Keegan, Mr. Christner, and Mr. White will work closely together on all aspects of this project, freely drawing upon Mr.

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<sup>2</sup> For example, all Balance staff have at least 10 years of experience, five or more years with Balance (and averaging nearly 14 years with Balance). ECORP staff have also been chosen to emphasize long tenures.

<sup>3</sup> Aiding the applicability and leading to 'shovel-readiness', it should be noted that all work subject to professional registration in California will be done by and under the direction of professional registered civil engineers (PEs) and geologists (PGs), as well as certified engineering geologists, certified hydrogeologists, and registered environmental assessors.

Hecht. They will participate in weekly conference calls for project coordination and to accentuate project communication.

We recognize that Jeff Meyer of ECORP has assisted PCWA staff with operational hydrology for many years. To be fair to all, we propose to draw upon Mr. Meyer's unique experience to assemble related data, but will leave its evaluation, integration with data from other water agencies and related recommendations in Mr. Hecht's hands.

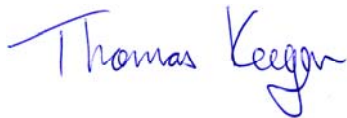
The Project Team has been active in the vicinity of the project area, having performed fish passage assessments, aquatic biological investigations, regulatory permitting, environmental documentation, Section 7 consultation for steelhead and Chinook salmon, and restoration planning for numerous projects in the Cosumnes River, American River, Bear River, Yuba River, and many other watersheds. The Project team is excited about the potential for working with CABY on this challenging and important project. Our enclosed proposal demonstrates our expertise in all technical areas identified in the RFP.

Our approach will be to work together as a team on all aspects of this project. A review of our relevant experience shows that our Project Team:

- has broad experience with complex regulatory issues throughout Placer County,
- has intimate familiarity and project experience with the Western Placer watersheds and streams,
- has exhibited our collective ability to work with varied watershed groups and collaboratives,
- has staff longevity with local clients, with repeat work being the norm, and
- has the respect of and working relationships with local, state, and federal agency personnel.

We look forward to working with CABY and the community on this challenging project. If you have any questions, please feel free to contact me (916) 782-9100. Thank you for your consideration on our proposal and I look forward to hearing from you.

Sincerely,



Thomas Keegan  
Principal, and Director, Aquatic Resources Group

Attachment(s)

Cc: Chris White, Balance Hydrologics, Inc.

## **ECORP CONSULTING, INC./BALANCE HYDROLOGICS INC. PROJECT TEAM – PROPOSED APPROACH, SCHEDULE, AND BUDGET**

### **Project Approach**

The goal of this project is to assemble the known watershed data for West Placer Creeks, identify missing data (data gaps) needed to provide the same level of detail for all creeks on watershed characteristics related to fish habitat enhancement and restoration, collect additional data as needed and prepare a prioritized fish habitat restoration plan for West Placer Creeks.

### **Phase One**

#### ***Task 1: Collect Existing Data and Conduct a Gap Analysis***

This task is focused on collection and review of existing data on watershed characteristics related to fish habitat conditions, identifying missing data (data gaps) and developing a strategy to obtain the missing information.

### **Data Collection**

This task requires collection of data on twelve (12) specific topics, as identified in the RFP: impervious cover, land use, riparian corridor regulations on setbacks, storm water management, in-stream habitat maps, in-stream flow requirements, hydrology and water use assessment, vegetation analysis, location map of fish passage barriers, brief assessment of sediment sources, and a description of water quality.

CABY staff have developed a preliminary bibliography of relevant reports, data and graphics on the eleven creeks to be included in the watershed assessment. These documents, many of which are already familiar to the project team, range widely in the type, extent, quality, completeness and relevance of the information included to the Project topics. For example, Fry's 1961 species-specific historic records on chinook stocks in the Central Valley provides very different information from the 2002 draft Auburn Ravine/Coon Creek Ecological Restoration Plan, which includes reach-level geomorphic assessments for Coon Creek and Auburn Ravine.

The team will begin by collecting, reviewing and evaluating available reports, data and other information and organizing the data using the process set forth in Chapter 4 of the 2005 California Watershed Assessment Manual (Vol. 1). For each study or dataset, the pertinent characteristics (e.g., watershed, type of data, source, metadata, quality, and utility) will be entered into a searchable database. These materials will be evaluated regarding the scale of work and the specific sites studied, applicability of the methods used, time-period of data collection and data quality - whether or not the work was peer reviewed or underwent a formal QA/QC process.

Next, we will consult with the Project Technical Advisory Group (TAG) regarding contacting agencies, groups and individuals in search of additional documents and data on the subject topics. On-line queries will be combined with personal contact via phone, email and regular mail. A preliminary list of likely sources would include: 1) federal agencies - the U.S. EPA's STORET and Legacy Data Center archives (water quality), USGS (flow and water quality), Natural Resources Conservation Service (soils maps); 2) state agencies - the State Water Resources Control Board Surface Water Monitoring Program (water quality), Regional Water Quality Control Board (water quality; toxics sites), CA Environmental Data Center (climate data), CA Dept. of Fish and Game (species and habitat data); CA Dept. of Water Resources (ground and surface water), Dept. of Health Services (drinking water assessments); CA Dept. of Pesticide Registration (water quality); and CA Geological Survey (geology maps); 3) Local County and municipal agencies, including Placer County Planning (CEQA docs), Public Works (infrastructure) and Flood Control

(stream gaging and flow modeling) agencies, and municipal Public Works and Planning departments for cities and towns in the subject watersheds; 4) Local watershed groups, such as the Dry Creek Conservancy, the American Basin Council of Watersheds, and Auburn-based Save Auburn Ravine Salmon and Steelhead (watershed assessments); 5) Regional water agencies - the Placer County Water Agency and Nevada Irrigation District Water District (surface water flow and use).

Materials received from these sources will be entered into the database and evaluated as described above. The completed database will provide the basis for updating the bibliography and producing the Gap Analysis. The latter document will describe where and what types of information are missing for each of the eleven streams. In consultation with the TAG, we will then develop a strategy for filling the gaps and creating a unified assessment at a consistent level for all of these streams through additional field data collection and analysis of aerial and other geo-spatial data, as described below in Task 2.

### ***Task 2: Collect Data and Conduct Field Work***

As stated in Task 1, the goal of this project is to assemble the known watershed data for West Placer Creeks, identify the missing data (data gaps), and prepare an 'informed' prioritized fish habitat restoration plan for West Placer Creeks. The purpose of this portion of the project is to fill-in data gaps identified in Task 1. Our approach to this portion of the project, and the accompanying scope of work, are dictated by the amount and type of missing data identified in Task 1.

### **Geo-Spatial (GIS)**

The Project Team proposes to use the Placer County land cover data base developed in 2001 to determine areas most likely to have riparian cover and then utilize our more recent in-house aerial imagery to update the data so that it contains the land use conversions made during the recent expansive growth period in this portion of the county. Updated land cover data will be overlaid on the project hydrology base data to identify and measure stream reaches with tree cover at the landscape level and classify tree cover type.

Non-river areas will be assessed using the methodology described above. ECORP's GIS department has previously updated the 2001 land cover database for all grassland habitat types. This will dramatically reduce the cost of completing the land cover analysis as the bulk of land use change has occurred on this habitat type in the previous 10 years. These data will also be used to assist with the hydrologic and hydraulic (H/H) analysis described later.

Additionally, it is anticipated that LIDAR data from the California Department of Water Resources (DWR) will become available in 2009. ECORP's GIS department has extensive experience utilizing LiDAR data, and expects to utilize this data set to update all topographic and hydrologic base maps for the study area, enabling 'informed' and consistent analyses. This LIDAR data set will also allow for the generation of 3D cartographic representations, which can be used for public outreach and education. Impervious surfaces, land use, and vegetation analysis can be assessed through analysis of geospatial data. Impervious surfaces and land use data are readily available geospatial data sets. Analysis tools within ArcGIS will generate area estimates for both categories. Actual land use categories need to be specified by the TAG. Usual categories include: industrial, urban, suburban, rural, riparian, agriculture, forested, and grassland. Percent land cover for each land use within each sub-watershed will be estimated through the analysis tools within ArcGIS.

The RFP also identifies "Vegetation Analysis" as one of the 12 areas where data are desired. It is unclear if the analysis should be for the whole watershed, or the riparian corridor. The watershed assessment is specifically intended to improve knowledge of fish habitat and barriers to fish access to spawning reaches. Vegetative cover in the riparian corridor can refer to the amount of overhanging vegetation

along stream banks and/or the presence of “natural” vegetation within the riparian corridor (buffer). Riparian vegetation is a subset of the overall watershed vegetation. Both will be estimated through the analysis of the updated Land Cover data set discussed above using the tools available within ArcGIS and/or available LIDAR data. ECORP has utilized this methodology to determine the areal coverage of tree canopy cover on multiple (> 10) projects in Sacramento and Placer counties. Additionally, Bill Christner completed a spatial and temporal GIS-based vegetation analysis of the riparian corridor as part of his doctoral research.

## **Regulatory Review**

Riparian corridor uses and setbacks, stormwater management, and in-stream flow requirements are all regulated. Riparian corridor setbacks can vary according to local jurisdiction, but certain setbacks are specified by state and federal agencies (CDFG, USACOE). The ordinary high water (OHW) mark is generally the accepted designation and is subjective by nature. The 100-yr floodplain is a more definitive designation and provides for more set back (buffer). GIS data for the 100-yr floodplain are also available for most main-stem channels from the Federal Emergency Management Agency (FEMA). While the 100-yr floodplain provides a definitive “border” between the riparian corridor and upland areas, FEMA maps have been known to be outdated due to the rapid pace of development within the 100-yr floodplain. The City of Lincoln has an updated 100-yr floodplain map that covers a sizeable portion of Placer County. This map can be integrated into any future H/H analysis. The Project Team will work with the TAG to define the desired setback most suitable for this portion of the assessment. ECORP has also worked with the city of Lincoln to identify areas within the city boundary and sphere of influence that need riparian setbacks as a part of their participation with the Placer County Conservation Plan (PCCP, aka: Placer County HCP) based on their general plan regulations.

Stormwater management is regulated under a variety of jurisdictions including: the Subdivision Map Act, California Environmental Quality Act (CEQA), Porter-Cologne Water Quality Control Act (sections 13260, 13301, 13304 and 13266), and California Department of Fish and Game Code (CDFG). Regulatory guidance and requirements are specified for Placer County in their Stormwater Management Manual (SWM, 1990). While the SWM is an evolutionary document, it does identify specific goals, principles, and policies to provide direction for storm water management strategies and practices. The Project Team will review the 1990 manual with the TAG to identify sections within the SWM that may need to be updated and/or improved. Placer County subdivision maps will be reviewed for completeness and accuracy. Any identified deficiencies will be evaluated during field data collection.

Evaluation of the SWM component is linked to the Hydrology and Water Use Assessment component (H/H). Precipitation is one part of the hydrologic cycle and defines the amount of water (input) that falls in a specific area. The rainfall/runoff relationship defines the amount of water that ultimately ends up in receiving waters. The rainfall/runoff relationship varies depending upon the intensity and duration of the precipitation event, type and amount of land use, topography (slope, aspect), and soil type and depth. The SWM specifies runoff computation methods (models) utilized to estimate runoff peaks. Model inputs require knowledge of travel distances, slopes, infiltration values, and the amount of pervious area for each watershed modeled. These data need to be verified and possibly updated to determine if they are representative of current watershed conditions. The Project Team has extensive experience estimating peak discharge ( $Q_{peak}$ ) with rainfall/runoff models. ECORP recently completed a rainfall/runoff estimate for two foothill watersheds south of U.S. Highway 50. The analysis included estimates of the current “natural” conditions and the proposed developed conditions. Results were used to estimate probable hydromodifications to receiving waters.

In-stream flow requirements are specified or recommended for individual waterways and are established by the minimum depth of water the particular species require to survive and/or migrate. The preferred depth of water for steelhead spawning is approximately 14 inches and ranges from 6 to 24 inches (Bovee

1978). Fry prefer water approximately 8 inches in depth and utilize water 2 to 14 inches deep, while parr (young fish) prefer a water depth of 10 inches but utilize water 10 to 20 inches deep (Bovee 1978).

Water depth in “natural” channels usually does not hinder migration because adult steelhead normally migrate during high flows. Depth can become a significant barrier or impedance in streams that have been altered for flood control purposes, especially those that do not have a low flow channel. It has been reported that seven inches is the minimum depth required for successful migration of adult steelhead (Thompson 1972, as cited in Barnhart 1986) although the distance fish must travel through shallow water areas is also a critical factor to consider. Excessive water velocity and obstacles which impede the swimming and jumping ability of fish, are more significant in hindering or blocking migration (Barnhart 1986).

The Project Team will review the minimum in-stream flows required for each West Placer Creek tributary identified by the TAG. The highly modified nature of the water distribution within West Placer Creeks requires knowledge of the various diversions, their ownership, locations, and water rights associated with each. Jeff Meyer of ECORP is the principal operations modeler of the Placer County Water Agency (PCWA) water distribution and delivery system. And is acting as the technical advisor for PCWA on Drum Spaulding – Yuba Bear Modeling in support of the FERC relicensing of these systems. Jeff’s knowledge of the PCWA, Drum Spaulding Yuba - Bear water distribution systems will help the Project Team assess the consistency of discharge information at various seasons and year types throughout most of the CABY project area.

Barry Hecht of Balance is one of the few senior hydrologists nationwide experienced with the role of fires and other episodic events as they affect low-flow use and passage of salmonids. He will work with Balance and ECORP staff to assess how future changes in land or water use may affect fish passage, dry-season or dry-year conditions.

### **Field Data Collection**

Field data will need to be collected to fill in data gaps and complete the assessments for: in-stream habitat, stream channel morphology, fish passage barriers, sediment sources, and water quality.

In-stream habitat, fish passage barrier, and sediment source data will all be collected as part of the stream channel geometry data collection component. Stream channel geometry will be assessed after methods outlined by Harrelson et al. (1994). Morphology results will be reported in Rosgen stream types to allow for comparison of the new data with those reported in DCC documents.

The Environmental Protection Agency (EPA) recently adopted the Watershed Assessment of River Stability and Sediment Supply (WARSSS) methodology to quantify the effects of land use on sediment relations and channel stability (2008). WARSSS is a geomorphology-based procedure that identifies the hillslope, hydrologic, and channel processes responsible for significant changes in erosion, sedimentation, and related stream channel instability. It uses a three-phase assessment process to quickly separate assessed areas into low, moderate, and high risk landscapes or river reaches. The Project Team suggests the TAG consider the use of this methodology for the West Placer Creeks project, as adapted to local conditions. WARSSS also provides an external basis for evaluating the consistency and completeness of the available data. The Project Team is trained in the use and application of the WARSSS methodology.

Fish habitat data will be collected by ECORP’s fishery biologists during collection of the geomorphic data. Fish habitat data will be collected after methods outlined in the current version of CDFG’s *California Salmonid Stream Habitat Restoration Manual* (Flossi et al., 1998) that characterizes stream habitat types. The field crew will consist of a qualified geomorphologist and fishery’s biologist working together to

collect the data required for both the fish habitat and geomorphic assessments. This approach proved beneficial in previous work on Secret Ravine and the Truckee River. GPS coordinates will be collected for each reference reach established during the geomorphic assessment. Coordinates will be stored in a traditional spatial geodatabase and converted to \*.kml files for use in Google-Earth, which will provide the broadest access possible to the data. This also allows for site-specific data and photographs to be attached to each reference reach through Google-Earth.

To develop a comprehensive description of water quality requires a clearly defined goal. Water quality (WQ) data vary both spatially and temporally. The extent of the assessment depends upon the desired level of data collection/sampling. Sampling every input, natural and man-made (pipe, culvert, etc) is possible, but also labor intensive and time consuming. The Project Team will work closely with the TAG to determine the level of WQ detail desired for each creek/sub-watershed within the West Placer Creeks project boundary. This will identify the number and location of sampling points, and desired constituents. Where available, sampling data will be analyzed in relation to established TMDL levels for each waterway. A minimum sampling protocol should sample the mouth and upstream reaches of each desired waterway. WQ samples will be tied to a discharge to calculate loadings. This will be accomplished at specified reference reach sites where channel geometry data have been established. Staff gages will be installed during field data collection. Stage-discharge relationships will be developed for each site. This will allow rapid correlation between WQ samples and discharge. The Project Team has extensive experience designing, collecting, and interpreting WQ data. Balance Hydrologics recently established the sediment transport trends for watersheds of the San Francisco and Monterey Bay areas. ECORP developed a WQ sampling protocol for Secret Ravine above Sierra College Blvd. Each WQ sample was tied to a specific discharge. The work allowed for both a WQ analysis and a rainfall/runoff analysis for the Secret Ravine watershed. These data, combined with the extensive experience of the Project Team, will reduce the field data collection component for the project.

### ***Task 3: Prepare Report***

The ECORP/Balance Project Team will prepare a draft and final Watershed Assessment Report (Report) that summarizes the conclusions, presents the data on which the conclusions are based, and provides a launching point for Phase 2 efforts. The Report will summarize the existing reports and data (Task 1), and present the results of the new data collection and field work (Task 2). The Report will detail existing conditions of eleven creeks in Western Placer County and provide a GIS-based map, identifying all fish passage barriers. Attributes associated with the GIS-based map will detail the conditions of each fish passage barrier, including: barrier height, type, and other unique characteristics of the barrier, and a list of the primary constraints to fish passage at each barrier. The Report will also contain a bibliography including all relevant watershed data and information. Key data (as specified by the TAG) will also be made available in .kml format (Google Earth) for public outreach. Examples of Google Earth display options will be made available upon request.

## **Phase Two**

### ***Task 1: Identify and Prioritize Restoration and Enhancement Projects***

The Project Team will develop a list of potential restoration and enhancement projects based on the results reported in the Watershed Assessment Report (Phase 1). Cost estimates for each project will be provided based on the Project Team's past experiences and current market rates. Project prioritization will be determined by the TAG in consultation with the Project Team. Prioritization criteria will be determined by a cost/benefit analysis for individual watersheds and the overall Western Placer watershed.

Project Team staff will attend the desired number of meetings with the Fish Working Group as necessary to finalize the project list of restoration and enhancement projects.

### **Time Frame and Work Schedule**

The West Placer Creeks Watershed Assessment is a comprehensive undertaking requiring multiple tasks and large data sets. The actual time required to achieve the assessment is dependant upon several variables, some of which will be unknown until initial tasks are completed.

#### ***Task 1***

Prior to the review and analysis of existing reports/data, the Project Team will meet with the TAG to determine the quality of the data desired by the TAG for the West Placer Creeks Watersheds (Project). Following the establishment of the data quality criteria, the Project Team will assemble the known data for the Project into a comprehensive and succinct report that identifies the type of data collected, the source of the data, who collected the data, the watershed where the data were collected, and any gaps to be addressed. The Project Team estimates it will require approximately six (6) months to identify, obtain, and assimilate the data into a searchable database.

#### ***Task 2***

Prior to collection of new data, the Project Team will meet with the TAG to identify the level of detail required for each watershed (stream vs. reach scale) and the appropriate methodologies and protocols needed in order to achieve the level of assessment desired by the TAG for each watershed. Following the establishment of these criteria, the Project Team, together with the TAG, will prioritize data collection sites and begin field work.

The amount of effort required for this task is difficult to estimate at this time because the amount of data to be collected will be unknown until Task 1 is completed. Given the scope of the Project includes eleven (11) streams; the field effort will be substantial. Based on past experiences this effort is estimated to require two (2) field seasons to complete. The first field season will be most intensive. Time between the two field seasons will allow for preliminary analysis of the data and adjustments to any unforeseen watershed and/or environmental condition(s). This will also provide the opportunity to identify the need for more data collection if desired/needed. The Project Team will also be able to provide a rough draft of the watershed assessment based on the preliminary data collected to-date.

#### ***Task 3***

Following completion of the field data collection component, the Project Team will begin to assemble and analyze the data. The final report will include individual watershed assessments for the eleven (11) creeks in Western Placer County; a GIS based map showing the location of all fish passage barriers with detailed descriptions; a list of the primary constraints to fish passage on all creeks; and a comprehensive bibliography. In addition to these products, the Project Team proposes to develop a searchable database for each watershed based on specific search criteria established by the TAG (stream type, substrate size/type, etc). The dataset will be linked with Google-Earth to achieve the broadest dissemination of the data possible. The Project Team estimates that it will require approximately one (1) year to produce the desired deliverables following completion of field data collection.

In addition to the proposed time frame/work schedule, the Project Team proposes to meet with the TAG at regularly scheduled intervals as determined/established by the TAG. This can be based on a calendar interval (monthly, bi-monthly) or by defined milestones (completion of field work in each watershed). The Project Team will work with the TAG to provide project updates at any desired schedule/interval.

Given the proposed schedule, the Project Team will be able to complete the desired watershed assessment by the end of 2012.

### **Cost of Service**

The proposed cost estimate for the identified Project Approach is estimated at \$466,886. Line item breakdowns are provided which have been prepared using reasonable assumptions and a sensible level of effort. We expect that these cost estimates would be refined after discussions with the TAG.

***Optional Vulnerability Analysis.*** We also provide costs for an Optional Vulnerability Analysis that considers the vulnerability of the individual waterways to anticipated future changes in land or water use. This is proposed to help apply projected land uses or factors affecting low and high flows in the planning process, and will assist in the cost/benefit analyses. For example, we will identify and prioritize the restoration and enhancement projects, followed by an analysis of the future potential problems that fish may experience following removal of the obstacle. Past experience suggests that the best plans also incorporate provisions for droughts or other episodic events, such as post-wildfire pulses of water and sediment, which would be incorporated during this task. Proposed costs for this optional task are estimated at \$36,040.

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**Estimated Cost Proposal**

*CABY: West Placer Creeks Watershed Assessment, Placer County, California*

<b>Task Number and Description</b>	<b>Estimated Cost</b>
<b>PHASE 1</b>	
<b>Task 1. Collect Existing Data and Reports; Gap Analysis (6 months)</b>	
1a. Backgrounding: review existing reports and data	\$24,788
1b. Contact federal, state and local agencies and groups re additional data	\$15,608
1c. Prepare Gap Analysis report, including Final Bibliography	\$16,484
1d. Quarterly project meetings with and/or progress reports to the TAG	<u>\$11,152</u>
<b>Subtotal, Phase 1/Task 1 labor</b>	<b>\$68,032</b>
<b>Task 2. Collect Additional Data to Fill Gaps (two seasons)</b>	
2a. Update, expand and refine GIS coverage; further analysis	\$23,410
2b. Regulatory review (setbacks; stormwater mgmt., instream flow req'ts)	\$13,168
2c. Field data collection (in-stream habitat, stream channel morphology, fish passage barriers, sediment sources, and water quality)	\$129,828
2d. Quarterly project meetings with and/or progress reports to the TAG	<u>\$19,556</u>
<b>Subtotal, Phase 1/Task 2 labor</b>	<b>\$185,962</b>
<b>Task 3. Prepare Watershed Assessment Report (6 months)</b>	
3a. Prepare draft and final Watershed Assessment Reports	\$92,760
3b. Prepare memo and GIS-based map of fish passage constraints	\$15,430
3c. Update bibliography and finalize	\$8,260
3d. Quarterly project meetings with and/or progress reports to the TAG	<u>\$10,690</u>
<b>Subtotal, Phase 1/Task 3 labor</b>	<b>\$127,140</b>
<b>PHASE 2</b>	
<b>Task 1. Identify and Prioritize Restoration and Enhancement Projects</b>	
1a. Identify and prioritize restoration and enhancement projects	\$65,662
1b. Quarterly project meetings with and/or progress reports to the TAG	<u>\$10,090</u>
<b>Subtotal, Phase 2/Task 1 labor</b>	<b>\$75,752</b>
<b>Estimated Expenses</b>	<b>\$10,000</b>
<b>TOTAL ESTIMATED PROGRAM COST</b>	<b><u>\$466,886</u></b>
<b>Task 0. Vulnerability Analysis (OPTIONAL)</b>	<u><b>\$36,040</b></u>

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**Notes:**

1. Budgeted amounts are preliminary cost estimates based on a sensible level of effort; to be refined after discussions with the TAG.
  2. Costs for project TAG meetings are included under each subtask. Any other public and/or agency meetings can be authorized separately on an as-needed basis
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## **ECORP CONSULTING, INC./BALANCE HYDROLOGICS, INC. PROJECT TEAM – FIRM DESCRIPTIONS AND KEY STAFF BIOSKETCHES**

### **ECORP Consulting, Inc.**

ECORP Consulting, Inc. (ECORP) is recognized as a consulting industry leader in full-service aquatic and terrestrial biology (in particular, special-status species resource management), regulatory compliance, and water resources/project operations modeling, with current staffing at about 90 full-time employees. ECORP's corporate contact information:

ECORP Consulting, Inc.  
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ECORP has a highly experienced team of fisheries and aquatic biologists/ecologists, geomorphologists, hydrologists, restoration specialists, and regulatory specialists who are well qualified to conduct regional planning assessments, bioassessments, and data collection activities covering the spectrum of watershed assessment activities for the CABY area. ECORP fisheries biologists have extensive regional experience, having provided fish population and passage assessments, and aquatic habitat bioassessments. ECORP staff have established professional working relationships with federal and state regulatory agencies and watershed groups, based on technical excellence and a thorough understanding of regulatory processes, and have exceptional skills working as liaison to the USACOE, NOAA/NMFS, USFWS, CDFG, SWRCB, and Lahontan Regional Water Quality Control Board.

### **Balance Hydrologics, Inc.**

Balance Hydrologics, Inc. (Balance) is a 34-person consultancy, recognized as a leader in the analysis and management of watershed, channel, ground-water and wetlands hydrologic processes. The firm has an interdisciplinary approach, building on a base of dedicated professionals in engineering, geology, geomorphology, hydrogeology and water-quality. Primary areas of expertise include:

- Hydraulic, hydrologic, sedimentologic and fish-passage modeling capabilities,
- Channel stability and flood hydrology including post-fire or post-disturbance effects
- Sediment-source analysis and sediment-transport modeling in natural channels,
- Long-term flow gaging and sediment-transport monitoring
- Surface- and ground-water hydrology, and their interaction, and how ground-water pumping and recharge can be planned to minimize effects on low-flow fish habitat
- Community and agency outreach, illustrating complex hydrologic interrelationships

### ***Field and Modeling Capabilities***

Balance owns a wide range of surface- and ground-water monitoring samplers and instrumentation, including high-flow sediment samplers used for measuring conditions in engineered and natural stream channels. The firm uses historical aerial photographs and remote-sensing data, integrated into GIS. We operate a series of stream gages, many of which are real-time, available to the public at <http://www.balancehydro.com/onlinegaging.shtml>. Balances' team of engineers and scientists are well-versed in the full range of hydraulic and hydrologic modeling platforms used in the analyses of natural channels, hydraulic structures, bridges and crossings, storm drains, and watershed runoff, including HEC- and HEC-Geo- series, HSPF, Mouse and Mike Urban by DHI, FESWMS, BAHM, and 2D hydraulic modeling using SMS and WMS software.

## **Proposed Project Staff**

ECORP and Balance have proposed to staff this project with veteran professionals who have shown long-term commitment to restoration projects, have served with their firms for many years, and who understand and can communicate complex watershed issues.

### ***ECORP Consulting, Inc.***

**Thomas Keegan, Principal Fisheries Scientist and Director of ECORPs Aquatic Resources Group**, with over 29 years of experience will be the Program Manager for this project, and will ensure that all necessary resources are available for Project success. Mr. Keegan has extensive expertise with anadromous salmonid population and passage investigations. He co-designed fish passage facilities in Secret Ravine (with Bill Christner), developed and managed a CALFED-funded plan for fish passage monitoring at the Butte Creek/Sanborn Slough Bifurcation Structure, assessed fish passage for the White Mallard Dam in Butte Creek, investigated 'false attraction' issues (Section 7) for Chinook salmon and steelhead resulting from treated wastewater outfalls in Auburn Ravine, permitted side channel habitat for juvenile salmonids at Lincoln Crossing (Auburn Ravine), evaluated passage conditions at the Eel River Cape Horn Dam fishway, designed and conducted anadromous fish passage monitoring at the Vern Freeman Diversion Dam in the Santa Clara River, evaluated flow-related fish entrainment and passage at several PG&E and SCE diversion dam/fish ladder facilities in the Kern River (No. 3 Powerhouse), North Fork Feather River (Poe, Rock Creek-Cresta, Pit River, and Upper North Fork Feather River hydro projects). Mr. Keegan has participated in numerous collaboratives, and has performed agency liaison/public outreach facilitation for numerous local hydro relicensing efforts.

**Bill Christner, MS, Fluvial Geomorphologist**, brings 12 years of diverse experience working on western streams, where his research has focused on land-use impacts on stream channel morphology and the use of natural channel design as an alternative to traditional water conveyance systems. Bill's expertise includes stream restoration and natural channel design, watershed assessment, hydromodification, discharge measurement techniques, hydric/wetland soil delineation, and sediment and soil analysis. He has worked on several local projects including geomorphic surveys and water quality assessments on Secret Ravine, channel restoration projects on Antelope Creek, geomorphic surveys on Auburn Ravine, and a geomorphic survey and assessment on the Truckee River.

**Craig Seltenrich, MS, Principal Aquatic Ecologist**, has over 29 years of experience in aquatic ecology including fisheries biology, amphibian ecology, and BMIs. He has designed and conducted numerous impact assessments on amphibians, aquatic reptiles, fish (including anadromous salmonids) and BMIs throughout northern California. He has prepared Biological Assessments and participated in "Section 7" consultations for spring-run Chinook salmon on the Yuba River and CV steelhead on the American River, Dry Creek, Miners Ravine, Secret Ravine, and the Yuba River. Mr. Seltenrich has expertise assessing affects of streamflow modifications on aquatic habitat, fish passage, and water quality on the Feather, Stanislaus, Mokelumne, American rivers, and other Placer County streams.

**Alicia Pool, Wildlife Ecologist**, has over 17 years of experience in wildlife and aquatic ecology emphasis in evaluation of habitat for sensitive aquatic and terrestrial species. Ms. Pool has worked extensively on evaluating flow-based habitat suitability for amphibians, reptiles, and fish. She is currently managing foothill yellow-legged frog surveys along 24 1 km river reaches in the Middle Yuba, South Yuba, Bear, and NF North Fork American rivers. Ms. Pool's expertise includes fisheries ecology (fish population/distribution studies) and stream habitat mapping to evaluate habitat utilization of salmonids. Ms. Pool supervised aquatic habitat inventories in Deer and Mill Creeks to assess Chinook salmon spawning habitat in both watersheds. She prepared environmental documentation for Yuba River anadromous fish screens in water rights reviews.

**Mr. Tom Scofield, Regulatory Specialist**, has over 19 years of experience working on permitting and environmental assessments to both public agencies and the private sector. He specializes in permitting to meet the regulatory requirements of the federal CWA (Sections 404 and 401), the federal ESA (Section 7 and 10), the California State Endangered Species Act (2050-2068), and the CDFG Section 1602 governing activities that may affect fish and wildlife habitats associated with streams and lakes.

**Sally Bartindale, Habitat Restoration Specialist**, has over eight years experience developing master plans, exhibits, and construction plan sets for habitat enhancement, soil and streambank stabilization, focusing on design and establishment of native riparian, wetland, and woodland plant communities. She works closely with technical experts to integrate habitat enhancement, restoration, and mitigation requirements with land use plans. She also has expertise in installing and monitoring restoration plantings, establishing native grasslands, stabilizing soil and streambanks, and providing management strategies for weed and pest control. Ms. Bartindale has provided technical assistance to the non-profit Wolf Creek Community Alliance.

**Jeff Meyer, PE, Hydrologist**, has 17 years of experience in environmental engineering and water resources management that includes hydrology development, stream flow gaging, model application development (OASIS), long/short term planning using position analysis, hydroelectric system evaluation and computer-aided dispute resolutions. Mr. Meyer has used OASIS to develop simulation applications for the PCWA, El Dorado Irrigation District, and numerous other agencies. Mr. Meyer has developed simulation models of the Middle Fork American River Project, Yuba-Bear and Drum-Spaulding projects, the North Fork Feather River system, and the Potter Valley system for the California Public Utilities Commission (CPUC). Currently, Mr. Meyer is assisting PCWA with the hydrology development, stream flow gaging, and model development for relicensing of the Middle Fork American River Hydroelectric Project.

**Dave Krolick, MA, GIS Analyst/GIS Department Manager**, has seven years of experience in large scale GPS data collection; GIS database design and spatial data modeling (raster and network based hydrologic modeling); and LiDAR datasets and computer based cartography. He has designed and conducted multiple sensitive species habitat mapping and analysis projects throughout Placer County, including impacts assessment to vegetation communities, jurisdictional wetlands, and aquatic habitat. He supervised mapping of sensitive species habitats in 24 separate properties for the Placer Vineyards Specific Plan, and created a GIS based hydrologic model of the American River basin north of Folsom Lake, allowing for comparison of spatial variables for individual catchments and discrete watersheds.

***Balance Hydrologics, Inc.***

**Barry Hecht, CEG, CHg, Principal Hydrologist/Geomorphologist** is a leading geomorphic researcher in salmonid management and protection, and has led development of plans and management programs for streams throughout the West for 35 years. Since 1988, he has directed Balance's studies of land-use effects on hydrology, erosion/sedimentation, and stream-corridor issues and pioneered development of several methods and approaches now used statewide to evaluate bank erosion and channel sedimentation. He has worked on evaluations of scour at bridges, channel migration rates and bed conditions affecting salmonid habitat throughout California, Oregon, Washington, and Alaska, using a combination of field work, modeling, and applications of aerial photographs and other archival information. Mr. Hecht is regarded as one of the leading hydrologists in the state on water-rights issues, especially those involving seepage or springs. He served for 10 years as the governor's at-large appointee on the CDFG Upper Sacramento River Salmon and Steelhead Advisory Committee and as a lead technical expert for CDFG in the CVPIA water-rights hearings during the mid-1990s.

**Chris White, REA, Principal Water Quality Specialist** manages the Auburn office and will serve as Balance's principal-in-charge for the West Placer Creeks project. A state-registered environmental

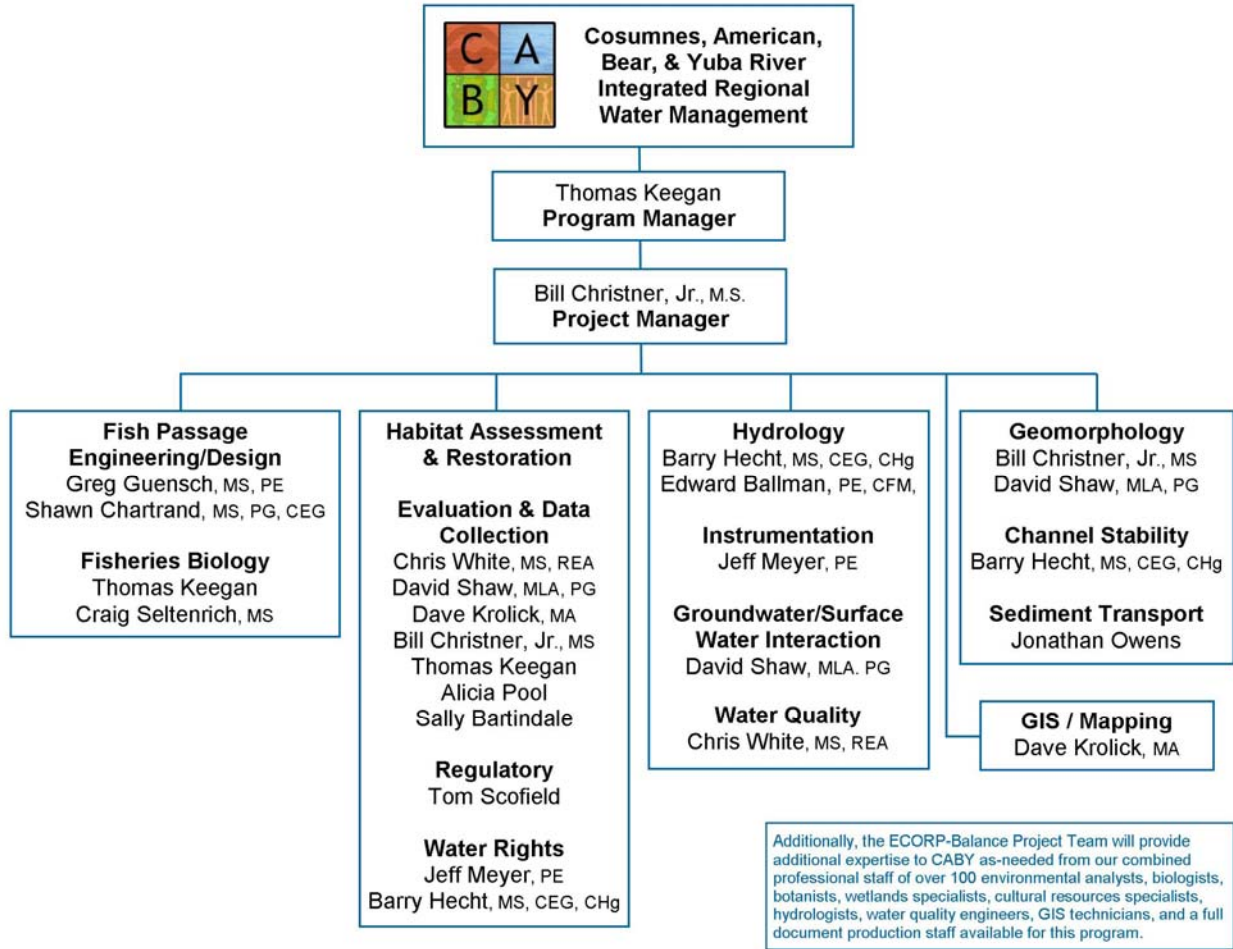
assessor (REA), Mr. White has led assessments of effects on Coon Creek of the proposed 400-acre Hidden Falls development, and heavy metals hazards in re-use of the Yuba Goldfields. He designs and manages complex monitoring plans to solve soil and water quality problems throughout the Foothills and Central Valley, emphasizing protection of seasonal and permanent wetlands, seeps, springs and streams. He pioneered peer-reviewed seasonal nitrogen budgets for Santa Cruz County that anchor its on-site waste-disposal ordinance. For over 10 years, he has co-managed the definitive Long-term Assessment and Monitoring Program for aquatic habitat for steelhead in the San Francisquito Creek watershed. Since 2005, he has regularly participated in and assisted watershed councils in the Bear, Yuba and American basins.

**Greg Guensch, PE, Engineer/Geomorphologist**, with 10 years of experience specializes in hydraulic analysis and modeling studies while also supervising plans and specifications for channel and wetland design, construction and restoration efforts. His areas of expertise include: hydraulics and fluid dynamics (particularly related to fish passage), hydrologic modeling, 1- and 2-dimensional hydraulic modeling of both stream and wetland systems, bioenergetics of salmonids, and channel/bank stabilization. Mr. Guensch is one of relatively few engineers who has modeled and calibrated fish-passage criteria and fish habitat quality in non-standard settings.

**David Shaw, PG, Hydrologist/Geomorphologist**, has worked for Balance for 11 years and manages the Truckee office. Mr. Shaw specializes in understanding the watershed dynamics, ground-water recharge and surface/ground water interaction of complex stream and wetland systems. He is currently directing two projects for EBMUD: (1) stabilizing and restoring 8500 feet of recently-incised channels and (2) enhancing low-flow hydrology for habitat throughout the 3800-acre Pinole Valley mitigation bank. He recently completed the geology, hydrology and water-quality portions of a watershed assessment for Pismo Creek in San Luis Obispo County, identifying water-quality effects of tar seeps and the (often beneficial) effects of small impoundments on anadromous fish habitat. He has overseen design and implementation of several stream restoration projects, including the City of Pleasanton's Bernal Creeks Project, wetland construction at Stanford University, and bank biostabilization plans in Portola Valley.

**Jonathan Owens, Senior Hydrologist/Engineer**, coordinates Balance's stream-gaging and sediment monitoring programs in over 30 watersheds throughout central and northern California. Mr. Owens is widely regarded as a regional expert in sediment transport, monitoring of flood conditions and effects of bed and bank vegetation management practices on roughness and channel stability. He has led Balance's geomorphic and sediment-transport investigations in the San Francisquito Creek watershed since 1995, and in the Pilarcitos, Gazos and San Gregorio Creek watersheds since 1998. He recently assisted State OEHHA staff with analysis of data collected by the Dry Creek Conservancy at several locations within the Dry Creek watershed (mainly Miners Ravine and Secret Ravine), constructing sediment-rating curves from turbidity-probe data, then developing annual sediment loadings or 'budgets'.

**Edward Ballman, PE, Principal Civil Engineer**, is a California-registered professional engineer, a certified floodplain manager (CFM), and a certified professional in stormwater quality (CPSWQ). Mr. Ballman is a statewide leader in flood protection, applying innovative answers to floodplain management and has directed many floodplain mapping and peak-flow modeling assessments throughout central and northern California. At Balance since 1998, he addresses a wide range of hydrologic and hydraulic simulation and design problems, at both the site and watershed scales and carries out statistical analyses of hydrologic data to support current design work, assisting in channel-stability and stream restoration efforts. His recently-implemented salmonid channel restoration projects include Stevens Creek in Cupertino, Refugio Creek in Hercules, Arana Gulch in Santa Cruz, and Happy Valley watershed, Alameda County.



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## **ECORP CONSULTING, INC. / BALANCE HYDROLOGICS, INC. PROJECT TEAM – SELECTED PROJECT BRIEFS**

### **Fish Passage**

#### ***Evaluation of Fish Passage, Aquatic Habitat, and Hydrology of Proposed Whitewater Park on Special-status Fish Species, Truckee River.***



The City of Sparks contracted with ECORP to prepare a BA with focused analysis of fish passage, aquatic habitat, stream channel and bank stability, and hydrology to evaluate if listed T&E species (Lahontan cutthroat trout and cui-ui) or their habitat may be adversely affected by construction of the proposed Rock Whitewater Park (Truckee River) and subsequent hydrologic conditions over flows ranging from between 10 and 90 percent exceedance. In-stream activities included the construction of five drop structures, current deflectors, and riffle bar structures. ECORP assessed post-construction bank and channel stability, and evaluated modeled stream velocities (HEC-RAS) within the entire project area as to suitability for upstream passage of listed and other native fish species. ECORP worked closely with State of

Nevada Department of Wildlife and the US Fish and Wildlife Service in developing criteria for assessment of fish passage and aquatic habitat. ECORP also meets regularly with the Truckee Meadows Water Authority Planning Group, for communication and coordination among several water projects on the Truckee River.

#### ***Estimation of Instream Discharge for Passage of Anadromous Fish through Critical Riffles in Stevens and Coyote Creeks, Santa Clara County, California***

Balance modeled flows needed by anadromous fish to pass previously-identified critical riffles on the two creeks as part of an effort to assess habitat conditions for chinook, steelhead, and other native fish species. We provided a range of passage flows for each riffle based on manual measurements of streamflow and bed conditions and hydraulic modeling to relate flow and bed conditions to passage. Results are being used by the Santa Clara Valley Water District to enhance fish-passage opportunities with flow releases from upstream reservoirs.



- Fish Passage at Butte Creek/Sanborn Slough Bifurcation Structure, Butte County [ECORP]
- Auburn Ravine Fish Passage and False Attraction Flow Analysis, Placer County [ECORP]
- Fish Passage Design and Total Station Survey in Miners Ravine [ECORP]
- White Mallard Dam and Fishway; Permitting and Fish Passage Assessment [ECORP]
- Pinole Creek Fish Passage Assessment, EBMUD's Pinole Valley Mitigation Bank, Contra Costa County, California [Balance]
- Passage-Enhancement Measures and Bank Protection Design, San Vicente Creek, Santa Cruz County, California [Balance]
- Tucker Ford Removal and Salmonid Fish Passage Enhancement, West Branch Soquel Creek, Santa Cruz County, California [Balance]
- N. Fork Sprague River Passage Restoration, Ganong Ranch, Klamath County, OR [Balance]

## Watershed Assessments

### *Pismo Creek Watershed Assessment and Enhancement, San Luis Obispo County, California*



Balance assisted Central Coast Salmon Enhancement during development of the Pismo Creek watershed management plan. We characterized hydrology, geology and geomorphology processes in the watershed and identified conditions and sites in the field where these processes affect anadromous fish and other aquatic species. We modeled peak-flow recurrences and magnitudes, calibrated against local data; estimated low flows by correlation to long-term records for nearby streams; and identified gaining and losing reaches. We linked our field observations to soils and geology maps and infrared aerial photographs, and related water-quality sampling results to local geologic formations.

### *San Mateo Creek Watershed Assessment and Steelhead Restoration Program*



ECORP worked closely with the California Coastal Conservancy (CCC), Trout Unlimited (TU), and the San Mateo Creek Watershed Technical Advisory Group (CDFG, NMFS, USFS, USFWS, Camp Pendleton MCB, and NGOs) to conduct a watershed assessment focusing on steelhead passage and habitat restoration in the San Mateo Canyon Wilderness, Cleveland National Forest. ECORP developed and implemented a watershed-wide, field-based Opportunities and Constraints analysis and watershed evaluation. In addition to recommendations for fish passage and habitat restoration efforts, exotic species control was

identified as an important component to reestablishment of steelhead in upper San Mateo Creek. A team of biologists from ECORP, CDFG and TU conducted two seasons of field studies to evaluate exotic species removal techniques, in the presence of special status amphibian species. The effect of population reseeding from upstream sources was also evaluated.

- Gualala River and Estuary Steelhead Enhancement Plan, Sonoma County [ECORP]
- Soquel Creek Watershed Enhancement Plan, Santa Cruz County [Balance]
- Arana Gulch Watershed Enhancement Plan, Santa Cruz County [Balance]
- Gazos Creek Watershed Enhancement Plan, San Mateo/Santa Cruz Counties [Balance]
- Pilarcitos Creek Watershed Assessment, San Mateo County, California [Balance]

## Habitat Assessment and Restoration

### *Dry Creek Coordinated Resource Management Plan*



ECORP prepared the *Dry Creek Coordinated Resource Management Plan and Miners Ravine Restoration Plan (Plan)*, a CalFed Bay-Delta Program funded program administered by Placer County, and together with the Dry Creek Conservancy (DCC) jointly authored the original funding proposal for the 1997 Proposition 204 Grant from the SWRCB. CALFED determined the project to be compatible with its ecological goals and granted \$605,000 in funding for its implementation.

Upon project award, ECORP worked closely with the DCC and the Dry Creek Watershed Council (DCWC) in preparing the Plan, the objectives of which emphasized water quality, floodplain management, and habitat restoration, while integrating recreational opportunities and water supply needs. ECORP examined urbanization impacts and recommended corrective actions; coordinated numerous stakeholders; and developed goals and objectives to protect and restore priority species and habitat. ECORP assisted the DCC in the development of a watershed-wide GIS database through data source coordination, georeferencing and projection of coverages, data gaps assessment, and QA/QC. ECORP used the GIS database to determine watershed data gaps and to assess watershed characteristics for the Plan.

### *El Dorado Hydroelectric Project, FERC License No. 184, FERC Collaborative and Relicensing Studies: Fisheries; BMI; and Special-Status Amphibians*



ECORP was contracted by EID to develop and carry out fish, benthic macroinvertebrate, and special status herpetofauna surveys in the South Fork American River and tributaries, and associated lakes and meadows. ECORP initiated the program with a project-wide evaluation of aquatic habitat types, an analysis of species-specific habitat requirements for potentially affected species, and selection of representative monitoring/survey sites through 1) analysis of aerial photographs and topographical maps, 2) review of current and historic fish and amphibian occurrences and habitat requirements, and 3) performance of ground-level habitat assessments. ECORP followed up with three seasons of field surveys for fisheries, BMI, and special status amphibians over 105 miles of streams, lake perimeters, and wet meadows. ECORP participated in the FERC collaborative process, working closely with the USFS, CDFG, SWRCB, and many NGOs on refining USFS and CDFG special conditions.

- Drum-Spaulding and Yuba-Bear Hydro Projects; Biological Surveys [ECORP]
- Aquatic Monitoring: SF American River Diversion Dam Construction [ECORP]

## Bank Stabilization/Channel Stability

### *Catalog of Active Sediment Sources and Control Opportunities, Apanolio Creek, Half Moon Bay, San Mateo County, California*



Balance inventoried problem sites in the Apanolio Creek watershed related to erosion of channel banks, hillslopes and roads from natural processes or anthropogenic practices. The San Mateo County RCD chose Apanolio Creek as the target tributary in the Pilarcitos Creek basin because: (1) it historically supported steelhead; (2) a concurrent project seeks to remove or modify three fish passage barriers; and (3) the Apanolio basin is a major source of bedload and suspended sediment. We produced a catalog for restoration which identifies apparent sediment source sites and recommends cost-effective repairs to reduce sediment delivery when funding becomes available.

- Royer Park Bank Stabilization Project on Dry Creek, Roseville, California [ECORP]
- Bank Stabilization at Auburn Ravine Stormwater Outfall, Lincoln, California [ECORP]
- Moore Road Widening Bank Stabilization Project, Auburn Ravine, California [ECORP]
- Geomorphic and River Channel Stability Assessment of the Merced River, Mariposa County, California [Balance]
- Bank Stabilization Design for Stanford University's C-1 Trail, Portola Valley, San Mateo County, California [Balance]
- Habitat-Enhancement Measures and Bank-Protection Design, San Lorenzo River Watershed, Santa Cruz County, California [Balance]
- Sisquoc River Channel Management Plans, Santa Barbara County, California [Balance]
- Special Area Management Plan (SAMP), San Juan and San Mateo Watersheds, Orange County, California [Balance]

## Ground-Surface Water Interaction (Baseflow/IFIM)

### *Hidden Falls Hydrogeologic Assessment, Placer County, California*



Balance assessed cumulative impacts on ground-water levels and quality, and surface water quality in Coon Creek, of sand filters and a community leachfield proposed for a 100-lot subdivision. Our approach combined aerial photograph review of bedrock fracture patterns and seepage areas; regional- and local-scale analyses of aquifer properties based on well log data; recession-period field measurements of flow and salinity in local seeps, springs, streams and wells; and 2-D modeling of changes in the water table and ground-water movements in the area of the leachfield under several discharge scenarios. Our report to Placer County indicated a potential rise in the local water table that could impact leachfield functioning and a significant increase in nitrate-nitrogen levels in Coon Creek when stream flows were low.

## **Water Quality**

### ***San Francisquito Creek Watershed Monitoring, San Mateo and Santa Clara Counties***

Since 1999, Balance has worked for Stanford University monitoring flows and water quality throughout the San Francisquito Creek watershed to support watershed management and steelhead habitat restoration efforts. Monitoring encompasses: 1) Gaging at full (continuous-record) and periodic streamflow stations in the Bear, Los Trancos and San Francisquito Creek watersheds; 2) water quality sampling under a full range of storm runoff and low-flow conditions for analysis of nutrients, metals, pesticides, salinity and sediment; and 3) Supporting the university in negotiations with regulatory agencies over the sediment TMDL for the watershed.

### ***Turbidity and Sediment Data Review, Dry Creek Watershed, Placer County, California***

Balance assisted Cal-EPA/ Office of Environmental Health Hazard Assessment (OEHHA) staff with analysis of data collected by the Dry Creek Conservancy at several locations in the Dry Creek watershed, primarily Miners Ravine and Secret Ravine. Balance reviewed gaging records and constructed sediment rating curves for stations having turbidity-probe data, then used those relationships to develop annual sediment loading budgets. As part of the quality-control portion of the project, Balance staff visited the field sites to identify site-specific conditions that could have affected the data and also assisted OEHHA staff in identifying periods of questionable data.

## **Local Gaging**

### ***Placer County Water Agency Hydroproject Relicensing; Hydrology***

ECORP is responsible for all aspects of water operations modeling for relicensing of the PCWA's Middle Fork American River Hydroelectric Project. ECORP has installed and maintained stream gage instrumentation throughout the project streams and reservoirs. ECORP is also responsible for Project surface water hydrology, and interacting with neighboring water agencies, regarding water rights and resource demands. ECORP regularly meets with the relicensing team, including state and federal agencies and NGOs.

- Georgetown Divide Public Utilities District Stream Gaging [ECORP]
- PCWA Stream Gaging on Auburn Ravine, Auburn to Lincoln [ECORP]

Balance has developed a program of using gaging data as a means of resolving conflict and unifying stakeholders using real-time hydrologic read-outs. Using the web or a phone, any interested party is able to find the current flow, water temperature, and specific conductance at one of the gages that the firm operates. Balance's format and output from many of these public gages can be accessed at <http://www.balancehydro.com/onlinegaging.shtml>.

## **Water Rights**

Balance has substantial expertise in complex water-rights issues, having served as the hydrologic and hydrogeologic consultant to the State Water Resources Control Board in the Mono Lake II decision of the 1990s. Current water-rights involvement includes: Lagunitas Creek (Marin Municipal Water District, since 1979), the Santa Ynez River (City of Santa Barbara and cooperators, since 1993) and the Klamath River (The Yurok Tribe and cooperators, since 1995).