MONTEREY COUNTY WATER RESOURCES AGENCY
AND FISHBIO
AGREEMENT FOR SERVICES

This is a multi-year agreement between the Monterey County Water Resources Agency, hereinafter called "Agency," and FISHBIO, a California Corporation, Oakdale, CA, hereinafter called "CONTRACTOR".

In consideration of the mutual covenants and conditions set forth in this Agreement, the parties agree as follows:

1. Employment of Contractor. Agency hereby engages CONTRACTOR, and CONTRACTOR hereby agrees to perform the services set forth in Exhibit A, in conformity with the terms of this Agreement. CONTRACTOR will complete all work in accordance with the **Scope of Work/Work Schedule set forth in Exhibit A**:

The scope of work is briefly described and outlined as follows: fisheries monitoring on the Salinas, Nacimiento and Arroyo Seco Rivers (see Exhibit A)

The CONTRACTOR shall perform its services under this agreement in accordance with usual and customary care and with generally accepted practices in effect at the time the services are rendered. The CONTRACTOR and its agents and employees performing work hereunder are specially trained, experienced, competent, and appropriately licensed to perform the work and deliver the services required by this Agreement.

(b) CONTRACTOR, its agents and employees shall perform all work in a safe and skillful manner and in compliance with all applicable laws and regulations. All work performed under this Agreement that is required by law to be performed or supervised by licensed personnel shall be performed in accordance with such licensing requirements.

(c) CONTRACTOR shall furnish, at its own expense, all materials and equipment necessary to carry out the terms of this Agreement, except as otherwise provided herein. CONTRACTOR shall not use Agency premises, property (including equipment, instruments, or supplies) or personnel for any purpose other than in the performance of its obligations hereunder.

2. Term of Agreement. The term of this Agreement shall begin upon execution of this Agreement by CONTRACTOR and Agency, and, unless earlier terminated as provided herein, shall remain in force until the work required by this Agreement is completed.

3. Payments to CONTRACTOR; maximum liability. Subject to the limitations set forth herein, Agency shall pay to CONTRACTOR the amounts provided in Exhibit B. The maximum amount payable to CONTRACTOR under this contract is three hundred eight two thousand six hundred twenty three dollars ($382,623.00).

4. Monthly Invoices by CONTRACTOR; Payment.

(a) CONTRACTOR shall submit to Agency an invoice, in a format approved by Agency, setting forth the amounts claimed by CONTRACTOR, together with an itemized basis for such amounts, and setting forth such other pertinent information Agency may require. CONTRACTOR shall submit such invoice monthly or as agreed by Agency, but in no event shall such invoice be submitted later than 30 days after completion of CONTRACTOR's work hereunder. Agency shall certify the claim if it complies with this contract and shall promptly submit such claim to the Monterey County Auditor-Controller, who shall pay the certified amount within 30 days after receiving the invoice certified by Agency. It is understood and agreed that CONTRACTOR shall complete all work described in Exhibit A for an amount not exceeding that set forth above, notwithstanding CONTRACTOR's submission of periodic invoices.

(b) CONTRACTOR agrees that Agency may withhold ten percent (10%) of the amount requested by CONTRACTOR from any progress payment, until such time as all goods and services are received in a manner and form acceptable to Agency.

(c) If, as of the date of execution of this Agreement, CONTRACTOR has already received payment from Agency for work which is the subject of this Agreement, such amounts shall be deemed to have been paid under this Agreement and shall be counted toward Agency's maximum liability set forthabove.

(d) CONTRACTOR shall not be reimbursed for travel expenses unless expressly stated in this Agreement.

5. Indemnification CONTRACTOR shall indemnify, defend, and hold harmless the Agency and the County of Monterey, their officers, agents, and employees, from and against any and all claims, liabilities, and losses whatsoever (including damages to property and injuries to or death of persons, court costs, and reasonable attorneys' fees) occurring or resulting to any and all persons, firms or corporations furnishing or supplying work, services, materials, or supplies in connection with the performance of this Agreement, and from any and all claims, liabilities, and losses occurring or resulting to any person, firm, or corporation for damage, injury, or death arising out of or

connected with the CONTRACTOR's performance of this Agreement, unless such claims, liabilities, or losses arise out of the sole negligence, active negligence, or willful misconduct of the Agency. CONTRACTOR's performance" includes CONTRACTOR's action or inaction and the action or inaction of CONTRACTOR's officers, employees, agents and subCONTRACTORs.

6. Insurance.

6.1 Evidence of Coverage:
Prior to commencement of this Agreement, the CONTRACTOR shall provide a "Certificate of Insurance" certifying that coverage as required herein has been obtained. Individual endorsements executed by the insurance carrier shall accompany the certificate. In addition the CONTRACTOR upon request shall provide a certified copy of the policy or policies.

This verification of coverage shall be sent to the Agency's Contact, unless otherwise directed. The CONTRACTOR shall not receive a "Notice to Proceed" with the work under this Agreement until it has obtained all insurance required and such, insurance has been approved by the Agency. This approval of insurance shall neither relieve nor decrease the liability of the CONTRACTOR.

6.2 Qualifying Insurers:
All coverage's, except surety, shall be issued by companies which hold a current policy holder's alphabetic and financial size category rating of not less than A-VII, according to the current Best's Key Rating Guide or a company of equal financial stability that is approved by the County's Purchasing Manager.

6.3 Insurance Coverage Requirements:
Without limiting CONTRACTOR's duty to indemnify, CONTRACTOR shall maintain in effect throughout the term of this Agreement a policy or policies of insurance with the following minimum limits of liability:

Commercial general liability insurance, including but not limited to premises and operations, including coverage for Bodily Injury and Property Damage, Personal Injury, Contractual Liability, Broad form Property Damage, Independent CONTRACTORs, Products and Completed Operations, with a combined single limit for Bodily Injury and Property Damage of not less than $1,000,000 per occurrence.

❑ Exemption/Modification (Justification attached; subject to approval).

Business automobile liability insurance, covering all motor vehicles, including owned, leased, non-owned, and hired vehicles, used in providing services under this Agreement, with a combined single limit for Bodily Injury and Property Damage of not less than $1,000,000 per occurrence.

❑ Exemption/Modification (Justification attached; subject to approval).

Workers' Compensation Insurance, if CONTRACTOR employs others in the performance of this Agreement, in accordance with California Labor Code section 3700 and with Employer's Liability limits not less than $1,000,000 each person, $1,000,000 each accident and $1,000,000 each disease.

❑ Exemption/Modification (Justification attached; subject to approval).

Professional liability insurance, if required for the professional services being provided, (e.g., those persons authorized by a license to engage in a business or profession regulated by the California Business and Professions Code), in the amount of not less than $1,000,000 per claim and $2,000,000 in the aggregate, to cover liability for malpractice or errors or omissions made in the course of rendering professional services. If professional liability insurance is written on a "claims-made" basis rather than an occurrence basis, the CONTRACTOR shall, upon the expiration or earlier termination of this Agreement, obtain extended reporting coverage ("tail coverage") with the same liability limits. Any such tail coverage shall continue for at least three years following the expiration or earlier termination of this Agreement.

❑ Exemption/Modification (Justification attached; subject to approval).

6.4 Other Insurance Requirements.

All insurance required by this Agreement shall be with a company acceptable to the Agency and issued and executed by an admitted insurer authorized to transact Insurance business in the State of California. Unless otherwise specified by this Agreement, all such insurance shall be written on an occurrence basis, or, if the policy is not written on an occurrence basis, such policy with the coverage required herein shall continue in effect for a period of three years following the date CONTRACTOR completes its performance of services under this Agreement.

Each liability policy shall provide that the Agency shall be given notice in writing at least thirty days in advance of any endorsed reduction in coverage or limit, cancellation, or intended non-renewal thereof. Each policy shall provide coverage for CONTRACTOR and additional insureds with respect to claims arising from each subCONTRACTOR, if any, performing work under this Agreement, or be accompanied by a certificate of insurance from each subCONTRACTOR showing each subCONTRACTOR has identical insurance coverage to the above requirements.

Commercial general liability and automobile liability policies shall provide an endorsement naming the Monterey County Water Resources Agency and the County of Monterey, their officers, agents, and employees as Additional Insureds with respect to liability arising out of the CONTRACTOR'S work, including ongoing and completed operations, and shall further provide that such insurance is primary insurance to any insurance or self-insurance maintained by the County

and that the insurance of the Additional Insureds shall not be called upon to contribute to a loss covered by the CONTRACTOR'S insurance. The required endorsement form for Commercial General Liability Additional Insured ***is ISO Form CG 20 10 11-85 or CG 20 10 10 01 in tandem with CG 20 37 10 01 (2000).*** *The required endorsement form for Automobile Additional Insured endorsement is* ***ISO Form CA 20 48 02 99.***

Prior to the execution of this Agreement by the Agency, CONTRACTOR shall file certificates of insurance with the Agency's contract administrator, showing that the CONTRACTOR has in effect the insurance required by this Agreement. The CONTRACTOR shall file a new or amended certificate of insurance within five calendar days after any change is made in any insurance policy, which would alter the information on the certificate then on file. Acceptance or approval of insurance shall in no way modify or change the indemnification clause in this Agreement, which shall continue in full force and effect.

CONTRACTOR shall at all times during the term of this Agreement maintain in force the insurance coverage required under this Agreement and shall send, without demand by Agency, annual certificates to Agency's Contract Administrator. If the certificate is not received by the expiration date, Agency shall notify CONTRACTOR and CONTRACTOR shall have five calendar days to send in the certificate, evidencing no lapse in coverage during the interim. Failure by CONTRACTOR to maintain such insurance is a default of this Agreement, which entitles Agency, at its sole discretion, to terminate this Agreement immediately.

7. Maintenance of Records. CONTRACTOR shall prepare, maintain and preserve all reports and records that may be required by federal, State, and local rules and regulations relating to services performed under this Agreement. CONTRACTOR shall retain all such records for at least five years from the date of final payment, or until any litigation relating to this Agreement is concluded, whichever is later.

8. Right to Audit at Any Time. Agency officials shall have the right, at any time during regular working hours and on reasonable advance notice, to examine, monitor and audit all work performed and all records, documents, conditions, activities and procedures of CONTRACTOR or its subCONTRACTORs relating to this Agreement. Government Code Section 8546.7 provides that an audit by the State Auditor General may be performed up to three years after the final payment under any contract involving the expenditure of public funds in excess of $10,000.

9. Confidentiality; Return of Records. CONTRACTOR and its officers, employees, agents, and subCONTRACTORs shall comply with all federal, State and local laws providing for the confidentiality of records and other information. To the extent permitted by applicable law and regulations, CONTRACTOR shall maintain confidentiality with respect to Agency 's well database and other water use data.

CONTRACTOR shall not disclose any confidential information received from Agency or prepared in connection with the performance of this Agreement without the express permission of Agency. CONTRACTOR shall promptly transmit to Agency all requests for disclosure of any such confidential information. CONTRACTOR shall not use any confidential information gained through the performance of this Agreement except for the purpose of carrying out CONTRACTOR's obligations hereunder. When this Agreement expires or terminates, CONTRACTOR shall return to Agency all records, which CONTRACTOR utilized or received, from Agency to perform services under this Agreement.

10. Termination. Either party may terminate this Agreement by giving written notice of termination to the other party at least thirty (30) days prior to the effective date of termination, which date shall be specified in any such notice. In the event of such termination, the amount payable hereunder shall be reduced in proportion to the services provided prior to the effective date of termination. Agency may terminate this Agreement at any time for good cause effective immediately upon written notice to CONTRACTOR. "Good cause" includes, without limitation, the failure of CONTRACTOR to perform the required services at the time and in the manner provided herein. If Agency terminates this Agreement for good cause, Agency may be relieved of the payment of any consideration to CONTRACTOR, and Agency may proceed with the work in any manner, which it deems proper. Costs incurred by Agency thereby shall be deducted from any sum due CONTRACTOR.

11. Amendments and Modifications. No modification or amendment of this agreement shall be valid unless it is set forth in writing and executed by the parties.

12. Non-Discrimination. Throughout the performance of this Agreement, CONTRACTOR will not unlawfully discriminate against any person because of race, color, religion, gender, national origin, ancestry, physical disability, medical condition, marital status, age older than 40, or sexual preference, either in CONTRACTOR's employment practices or in the furnishing of services to recipients. CONTRACTOR shall ensure that the evaluation and treatment of its employees and applicants for employment and all persons receiving and requesting services are free of such discrimination. CONTRACTOR shall comply fully with all federal, State and local laws and regulations which prohibit discrimination. The provision of services primarily or exclusively to any target population designated herein shall not be deemed prohibited discrimination.

13. Independent Contractor. In its performance under this Agreement, CONTRACTOR is at all times acting and performing as an independent CONTRACTOR and not an employee of Agency. No offer or obligation of employment with Agency is intended in any manner, and CONTRACTOR shall not become entitled by virtue of this Agreement to receive from Agency any form of benefits accorded to employees including without limitation leave time, health insurance, workers compensation coverage, disability benefits, and retirement contributions. CONTRACTOR shall be solely liable for and

obligated to pay directly all applicable taxes, including without limitation federal and State income taxes and social security arising out of CONTRACTOR's performance of this Agreement. In connection therewith, CONTRACTOR shall defend, indemnify, and hold harmless Agency from any and all liability, which Agency may incur because of CONTRACTOR's failure to make such payments.

14. Delegation of Duties; Subcontracting. CONTRACTOR is engaged by Agency for its unique qualifications and abilities. CONTRACTOR may not, therefore, delegate any of its basic duties under this Agreement, except to the extent that delegation to CONTRACTOR's employees is contemplated herein. No work shall be subcontracted without the written consent of Agency, except as provided in this Agreement or its attachments. Notwithstanding any subcontract, CONTRACTOR shall continue to be liable to Agency for the performance of all work hereunder. CONTRACTOR shall not assign, sell, mortgage or otherwise transfer its interest or obligations in this Agreement without Agency 's prior written consent.

15. Agency 's Rights in Work Product. All original materials prepared by CONTRACTOR in connection with its work hereunder -- including but not limited to computer codes, customized computer routines developed using proprietary or commercial software packages, reports, documents, maps, graphs, charts, photographs and photographic negatives -- shall be the property of Agency and shall be delivered to Agency prior to final payment. CONTRACTOR may utilize any existing materials developed by CONTRACTOR prior to commencement of work under this Agreement, which materials shall remain the property of CONTRACTOR.

16. Compliance with Terms of Federal or State Grant. If any part of this Agreement has been or will be funded pursuant to a grant from the federal or State government in which Agency is the grantee, CONTRACTOR shall comply with all provisions of such grant applicable to CONTRACTOR's work hereunder, and said provisions shall be deemed a part of this Agreement as though fully set forth herein.

17. Conflict of Interest. CONTRACTOR warrants that it presently has no interest and shall not acquire any interest during the term of this Agreement, which would directly or indirectly conflict in any manner or to any degree with its full and complete performance of all services under this Agreement.

18. Governing Laws. This Agreement is entered into in the County of Monterey, State of California, and shall be construed and enforced in accordance with the laws of the State of California. The parties hereby agree that the County of Monterey shall be the proper venue for any dispute arising hereunder.

19. Compliance with Applicable Law. The parties shall comply with all applicable federal, state, and local laws and regulations in performing this Agreement.

20. Construction of Agreement. The parties agree that each party has fully participated in the review and revision of this Agreement and that any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Agreement or any exhibit or amendment. To that end, it is understood and agreed that this Agreement has been arrived at through negotiation, and that neither party is to be deemed the party which prepared this Agreement within the meaning of Civil Code Section 1654. Section and paragraph headings appearing herein are for convenience only and shall not be used to interpret the terms of this Agreement.

21. Waiver. Any waiver of any term or condition hereof must be in writing. No such waiver shall be construed as a waiver of any other term or condition herein.

22. Successors and Assigns. This Agreement and all rights, privileges, duties and obligations hereunder, to the extent assignable or delegable, shall be binding upon and inure to the benefit of the parties and their respective successors, permitted assigns and heirs.

23. Contractor. The term "CONTRACTOR" as used in this Agreement includes CONTRACTOR's officers, agents, and employees acting on Contactor's behalf in the performance of this Agreement.

24. Interpretation of Conflicting Provisions. In the event of any conflict or inconsistency between the provisions of this Agreement and the Provisions of any exhibit or other attachment to this Agreement, the provisions of this Agreement shall prevail and control.

25. Time is of the Essence. The parties mutually acknowledge and agree that time is of the essence with respect to every provision hereof in which time is an element. No extension of time for performance of any obligation or act shall be deemed an extension of time for performance of any other obligation or act, nor shall any such extension create a precedent for any further or future extension.

26. Contract Administrators.

CONTRACTOR's designated principal responsible for administering CONTRACTOR's work under this Agreement shall be
Doug Demko and Ryan Cuthbert

Agency's designated administrator of this Agreement shall be
Elizabeth Krafft

27. Notices. Notices required under this Agreement shall be delivered personally or by electronic facsimile, or by first class or certified mail with postage prepaid. Notice shall be deemed effective upon personal delivery or facsimile transmission, or on the third day after deposit with the U.S. Postal Service. CONTRACTOR shall give Agency prompt notice of any change of address. Unless otherwise changed according to these notice provisions, notices shall be addressed as follows:

TO AGENCY	TO CONTRACTOR
Name: MCWRA	Name: Doug Demko, Principal FISHBIO
Address: PO Box 930 Salinas, CA 93902	Address: 1617 S. Yosemite Avenue Oakdale, CA 95361
Telephone: 831.755.4860	Telephone: 209.847.6300
Fax: 831.424.7935	Fax: 209.847.1925
E-Mail: krafftea@co.monterey.ca.us	E-Mail: dougdemko@fishbio.com

28. Electronic Deliverables. Where feasible, all reports, documents and other printed information provided to the Agency pursuant to this Agreement shall be submitted in both written and Electronic formats in accordance with the specifications listed in Exhibit C.

29. Non-exclusive Agreement. This Agreement is non-exclusive and both parties reserve the right to contract with other entities for the same or similar services.

30. Execution of Agreement. Any individual executing this Agreement on behalf of an entity represents and warrants that he or she has the requisite authority to enter into this Agreement on behalf of such entity and to bind the entity to the terms and conditions hereof. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement.

31. Exhibits. The following Exhibits are attached hereto and incorporated by reference:

Exhibit A - Scope of Work/ Work Schedule
Exhibit B - Budget
Exhibit C -

32. Entire Agreement --As of the effective date of this Agreement, this document, including all exhibits hereto, constitutes the entire agreement between the parties, and supersedes any and all prior written or oral negotiations and representations between the parties concerning all matters relating to the subject of this Agreement.

MONTEREY COUNTY WATER RESOURCES AGENCY
AND FISHBIO
AGREEMENT FOR SERVICES

IN WITNESS WHEREOF, AGENCY and CONTRACTOR execute this agreement as follows:

MONTEREY COUNTY WATER RESOURCES AGENCY:

BY: David E. Chardavoyne

David E. Chardavoyne
Interim General Manager

Date: 11/29/12

CONTRACTOR:

BY: _____

Type Name: Doug Demko
Title: Principal

Date: 10/23/12

BY: _____

Type Name: _____
Title: _____

Date: _____

* INSTRUCTIONS: If CONTRACTOR is a corporation (including limited liability and nonprofit corporations), the full legal name of the corporation shall be set forth together with the signatures of two specified officers. If CONTRACTOR is a partnership, the name of the partnership shall be set forth together with the signature of a partner with authority to execute this Agreement on behalf of the partnership. If CONTRACTOR is contracting in an individual capacity, the individual shall set forth the name of his or her business, if any, and shall personally sign the Agreement.

(_____)

Agreement/Amendment No # (_____)

* *

Approved as to form [1]:

Deputy County Counsel

Dated: 11/16/12

Approved as to fiscal provisions:

Administrative Analyst

Dated: 11-28-12

RISK MANAGEMENT
COUNTY OF MONTEREY
~~APPROVED AS TO INDEMNITY/~~
~~INSURANCE LANGUAGE~~

~~Risk Management~~:

By: Lydia Schumaker

~~Date~~ Dated: 11-16-12

Auditor-Controller [2]:

Dated: 11-16-12

[1] Approval by County Counsel is required, and/or when legal services are rendered
[2] Approval by Auditor-Controller is required

EXHIBIT A

EXHIBIT A
Scope of Work/Work Schedule

This scope of work pertains to fisheries monitoring on the Salinas, Nacimiento and Arroyo Seco Rivers. (Detailed operating procedures, including monitoring of environmental variables and equipment maintenance are attached as Appendices to this scope.)

Task 1. Adult Upstream Migration (Adult Escapement)

Sub-task 1.1 Project Planning
FISHBIO, under the oversight of the Monterey County Water Resources Agency (Agency) will revise operations plan, build relationships with landowners, obtain required scientific collecting permits as well as other pertinent authorizations, and use existing equipment to install and operate a weir and Riverwatcher on the Salinas River (near the Salinas River Diversion Facility at the same location used in 2010 and 2011) to meet current and future monitoring goals as determined by the Agency.

Sub-task 1.2 Weir and Riverwatcher Installation, Operation and Removal
FISHBIO will install the Weir and Riverwatcher on the Salinas River near Marina, CA by November 30 in anticipation of a December 1 monitoring season start date. FISHBIO will implement unique, site-specific installation techniques developed during the 2010 and 2011 monitoring seasons. These techniques are very important to successful weir operation giver the site characteristics (i.e. sand substrate, tidal influence, etc.). The monitoring protocols in Appendix A will be followed.

Sub-task 1.3 Data Management and Reporting
Field staff will enter all data into an Access database a minimum of three times per week and electronic data will be checked for accuracy "line by line" against the original data sheets for quality assurance. Digital photographs of filed activities, equipment and fish species will be taken and provided to the Agency.

FISHBIO will distribute real-time summaries of events that deserve special attention in the form of e-mails and phone conservations. This includes results of mark-recapture studies, equipment problems or other crucial information. A comprehensive mid-season monitoring technical memorandum (tech memo) will be provided to the Agency. At the end of the monitoring season, FISHBIO will prepare a written report describing the year's events and study findings. The report will include a detailed description of the project locations and physical attributes, sampling and analytical methods, results, conclusions and recommendations for future efforts.

All raw data will be provided to the Agency in Access and a summarized file in Excel, and the annual report will be provided electronically in both .pdf and MS word format by June 1.

Task 2. Smolt Outmigration Monitoring (Rotary Screw Traps)

Subtask 2.1Project Planning
FISHBIO, under the oversight of the Agency will revise operations plan, build relationships with landowners, obtain required scientific collecting permits as well as other pertinent authorizations, and use existing equipment to install and operate Rotary Screw Traps (RSTs) on the Salinas, Arroyo Seco and Nacimiento Rivers to meet current and future monitoring goals as determined by the Agency.

Subtask 2.2 RST Installation, Operation and Removal
Once all permits and landowner authorizations have been secured, a team of 4-6 experienced technicians will install the RSTs prior to March 15th, operate the RSTs through May 31st, and remove, clean, repair, and prepare the traps for storage. Traps will be installed using a variety of techniques developed and improved during the 2010-2012 monitoring seasons. The protocols in Appendix B will be utilized.

Three RSTs (Salinas, Arroyo Seco and Nacimiento) will be operated seven days per week March 15th to May 31st to determine the timing and abundance of juvenile steelhead migration in the Salinas River Basin. Traps will be removed within a few days following the end of the monitoring period and will be pressure washed, inspected for any damage that may have occurred during the operating season and any necessary repairs will be made. Traps will be transported to a location chosen by the Agency for off-season storage.

Sub-task 2.3 Data Management and Reporting
Field staff will enter all data into an Access database a minimum of three times per week and electronic data will be checked for accuracy "line by line" against the original data sheets for quality assurance. Digital photographs of filed activities, equipment and fish species will be taken and provided to the Agency.

FISHBIO will distribute real-time summaries of events that deserve special attention in the form of e-mails and phone conservations. This includes results of mark-recapture studies, equipment problems or other crucial information. A comprehensive mid-season monitoring technical memorandum (tech memo) will be provided to the Agency. At the end of the monitoring season, FISHBIO will prepare a written report describing the year's events and study findings. The report will include a detailed description of the project locations and physical attributes, sampling and analytical methods, results, conclusions and recommendations for future efforts.

All raw data will be provided to the Agency in Access and a summarized file in Excel, and the annual report will be provided electronically in both .pdf and MS word format by August 1.

Task 3. Index Reach Surveys

Sub-task 3.1 Project Planning
FISHBIO, under the oversight of the Monterey County Water Resources Agency (Agency) will create or revise operations plan, build relationships with landowners, obtain required scientific collecting permits as well as other pertinent authorizations, and use existing equipment to conduct index-reach surveys on the Arroyo Seco and Nacimiento Rivers in a manner consistent with 2010 and 2011 surveys and to meet current and future goals as determined by the Agency.

FISHBIO will perform a reconnaissance survey of the entire Nacimiento River (approximately 10 river miles) under minimum flow conditions (60 cfs) to identify survey sites conducive to electrofishing depletion sampling. In the event that insufficient electrofishing depletion sampling sites are identified, then multi-pass dive counts in the Nacimineto River would be warranted.

Sub-task 3.2 Conduct Index-Reach Surveys and Associated Activities
FISHBIO will utilize operational procedures as outlined in Appendix C to conduct the index reach surveys and/or snorkeling surveys.

Sub-task 3.3 Data Management and Reporting
Field staff will enter all data into an Access database a minimum of three times per week and electronic data will be checked for accuracy "line by line" against the original data sheets for quality assurance. Digital photographs of filed activities, equipment and fish species will be taken and provided to the Agency.

FISHBIO will distribute real-time summaries of events that deserve special attention in the form of e-mails and phone conservations. This includes results of mark-recapture studies, equipment problems or other crucial information. A comprehensive mid-season monitoring technical memorandum (tech memo) will be provided to the Agency. At the end of the monitoring season, FISHBIO will prepare a written report describing the year's events and study findings. The report will include a detailed description of the project locations and physical attributes, sampling and analytical methods, results, conclusions and recommendations for future efforts.

All raw data will be provided to the Agency in Access and a summarized file in Excel, and the annual report will be provided electronically in both .pdf and MS word format.

Task 4. On-call Services

FISHBIO will provide on-call services, including emergency services outside of normal business hours to the Agency as requested for the duration of this contract. Since the frequency or necessity on-call services is not known, FISHBIO will invoice the Agency based on a time and materials basis as shown in Table 1.

APPENDIX A: PORTABLE RESISTANCE BOARD WEIR AND VAKI RIVERWATCHER MONITORING PROTOCOL – SALINAS RIVER

General Instructions

Safety should always be your primary concern. Never perform a task if it cannot be performed safely. Stay aware of your surroundings and possible hazards at all times. Make suggestions about improvements to safety procedures to your partner in the field, project field leader, and/or to the project manager.

A minimum of two crewmembers will operate the trap at any time. At least one crewmember must have a working cell phone when in the field. Life-jackets are to be worn at all times while in a boat, on the weir, or in the river. First aid kits, emergency road flares, and fire extinguishers will be maintained in all vehicles and boats.

Weirs and associated rigging are a possible hazard to boaters, swimmers and others using the river. Wires and cables should be marked with bright colored flagging or reflection tape to be easily seen. Signs should be positioned both upstream and downstream of the weir to instruct boaters and swimmers how to avoid the trap. A sign should also be positioned adjacent to the Weir to instruct the public on the associated dangers of the Weir. Other protective measures may include flashing lights to improve the visibility of boat passage and rigid components of the weir.

Weir Operation and Maintenance

Installation

Typically, a portable resistance board weir and Riverwatcher requires two days to install and can be removed in one day. A Weir is composed of four main components: a substrate rail, rigid weir, resistance weir, and modified fish passage resistance panel (Figure A-1). Refer to Cuthbert (2012) for detailed installation instructions; whereby, this particular installation requires skilled technicians that are SCUBA certified with experience using air tools in an aquatic environment due to the very poor visibility caused by high turbidity levels in the Salinas River. SCUBA divers essentially have to install the substrate rail without sight.

Figure A-1. Photos of a section of substrate rail prior to installation (left), rigid weir installed in the Stanislaus River (left-center), technicians installing a resistance weir panel (right center), and modified fish passage resistance panel.

The fabrication and configuration of the weir generally followed guidelines found in Tobin (1994) and Stewart (2002, 2003); however, slight adjustments were made to

accommodate the site-specific attributes of this installation. For example, we modified the livebox to accommodate the Riverwatcher components and operational procedures were added to account for downloading the Riverwatcher data and inspecting the Riverwatcher components.

The Riverwatcher system was used in conjunction with the weir to monitor fish passage without the need to capture or handle fish. The Riverwatcher system is comprised of three main components: an infrared scanner, a digital video camera with lights housed in a stainless steel camera tunnel, and a computer system.

Weir Monitoring

The weir is inspected and cleaned a minimum of twice per week, and more frequently when debris loads are heavy. First and foremost the weir is inspected for any problems that could be a safety concern (i.e. boat passage issues, missing warning signs). The resistance weir panels should be inspected for broken stringers or PVC pickets and the resistance boards should be inspected for performance and function (i.e. correct board angles). The substrate rail and cable should be inspected for any cracked welds or frayed cables and the substrate should be monitored for scouring at or immediately adjacent to the weir and substrate rail.

Real-time river flows and precipitation will be monitored in relation to weir operation. In order to predict the proper operational time periods of the weir, flow and precipitation predictions will be monitored and weir operations will be determined based on predetermined "flow triggers". Precipitation predictions are obtained from a MCWRA climate consultant and flows predictions are obtained from the National Weather Service California Nevada River Forecast Center (http://www.cnrfc.noaa.gov/graphicalRVF.php?id=SPRC1) or the National Weather Service Advanced Hydrologic Prediction Service (http://water.weather.gov/ahps2/hydrograph.php?wfo=mtr&gage=sprc1&view=1,1,1,1,1,1,1,1).

The following "flow triggers" for the 2011/12 monitoring season were determined based on a combination of "flow triggers" from weir monitoring on the Stanislaus and Tuolumne River weirs and the characteristics of the Salinas River weir site (Table A-1).

Table A-1. Predicted Salinas River flow triggers at Spreckels and weir operational actions when triggers are activated.

Flow Trigger (Predicted)	Operational Action
>1,750 cfs sustained for greater than 24 hrs.	Remove weir prior to predicted flows reaching 1,200 cfs.
<500-600 cfs	Reinstall weir if the predicted flow is sustained at <1,750 cfs for72 hrs or longer.

Bathymetry Monitoring

Using an auto-level and established benchmarks, transect data will be recorded to document riverbed bathymetry including top of bank/floodplain data in the vicinity of the weir. Transect locations will be marked with permanent reference stakes at the endpoints. Sampling of established transects will be recorded at regular intervals (every two weeks) over the sampling season. Additionally, transect data will be collected immediately following flow events (freshets or dam discharges) which will likely contribute to accelerated scour/sedimentation. Transect information will be collected at increasing distance intervals (no greater than 30 feet apart) above and below the weir. A control site should also be established adjacent to the weir site, preferably upstream, or otherwise beyond the influence of the weir where transect data will be concurrently collected. Transect data will be recorded at the following distance intervals:

1. 30 feet upstream
2. 10 feet upstream
3. At the substrate rail
4. 10 feet downstream (mid-panel)
5. 20 feet downstream (end of panel)
6. 30 feet downstream
7. 60 feet downstream
8. 90 feet downstream
9. 120 feet downstream

Additional transect(s) may be added if scour/sedimentation is evident beyond the proposed distances or additional detail is required. If a continuous record of river stage is required, water level data loggers (Onset, Pocasset, MA; U20) will be deployed in secured stilling wells above and below the weir.

Data Collection

Fish Passage Data

The Vaki Riverwatcher autonomously collects size, and timing data on each fish passage. A technician downloads the data during a daily weir check; if no technician is on-site the data can also be downloaded through a wireless VPN connection. The VPN connection is also used to check the connection status of the Riverwatcher.

Data downloads are imported to the Winari database back at the office. The Winari database is a tool provided by Vaki to aid in the efficient and effective review of the Riverwatcher data.

After each passage is identified to species, data is exported into an Excel spreadsheet and associated characteristics (e.g. fish condition and total length) are recorded for all fish passages, additional characteristics (e.g., gender, presence/absence of ad-clip, and silhouette quality) are recorded for each steelhead passage. Silhouette quality is used qualitatively to describe the confidence in the passage identification. A fish is ranked as "poor" when it is difficult to identify any of the morphologic features used to identify

steelhead from the given silhouette. A "fair" ranking is given when there is at least one morphologic feature identified in the silhouette, and a "good" ranking indicated that the majority of the morphologic features are identifiable in the silhouette. The daily passage counts, as well as the season total abundance, consists of net upstream passages (upstream passages – downstream passages).

The Riverwatcher system estimates total length based on the depth of the fish and a length coefficient. Due to the lack of site-specific morphometric data for adult steelhead, a user-defined coefficient was derived from a body depth to total length ratio from measurements of trapped fish and carcasses taken at the Stanislaus River Weir. The user-defined coefficient is applied to the Riverwatcher system's estimated fish depths at the Salinas River Weir to estimate total length. The coefficient was derived by the following equation:

$$l = \frac{tl}{d}$$

where, l is the length coefficient, tl is the total length, and d is the body depth of the measured fish. The mean of the coefficients (lm) of all the measured fish was then used to estimate total length of the fish recorded by the Riverwatcher system using the following equation:

$$L = D * lm$$

where, L is the estimated total length, D is the body depth measured by the Riverwatcher system, and lm is the mean of coefficients. The user-defined coefficients derived from Stanislaus River Weir data are provided in Table A-2.

Table A-2. Winari database user defined length coefficient means from 2003 through 2009 Stanislaus River Weir trapping and carcass data.

Species Name	Common Name	n	Length Coefficient
Cyprinus carpio	carp	12	3.7
Ictalurus sp.	catfish	2	4.5
Ptychocheilus grandis	Sacramento pikeminnow	1	5.2
Catostomus occidentalis	Sacramento sucker	13	5.6
Oncorhynchus mykiss	steelhead	16	4.8
Morone saxatilis	striped bass	16	4.5
Unidentified	unidentified	-	6.0

Carcass Data

If carcasses are recovered from the Weir they will be measured for length and body depth. They will be identified to species and pertinent scale or tissue samples will be taken and archived. Appropriate protocols for the processing of carcasses will be coordinated with a California Department of Fish and Game (CDFG) biologist. NMFS and CDFG will be contacted in the event that a steelhead carcass is recovered from the Weir.

Environmental Data

Physical data to be collected during each weir check includes water temperature (°F), dissolved oxygen (mg/L), turbidity (Nephelometric Turbidity Units; NTU), weather

conditions (RAN = rain, CLD = cloudy, CLR = clear, FOG = fog), and water velocity (ft/s) measurements at the opening of the livebox. Instantaneous water temperature and dissolved oxygen are recorded using an Exstick II model DO600 Dissolved Oxygen Meter (Extech Instruments Corporation, Waltham, Massachusetts, USA). Daily average water temperature is calculated from data that was logged hourly using a submersible temperature logger (Hobo Water Temp Pro V2, Onset Computer Corporation, Pocasset, MA). Instantaneous turbidity is recorded using a model 2020e Turbidimeter (LaMotte Co., Chestertown, Maryland, USA), and instantaneous water velocity is measured using a digital Flow Probe model FP-101 (Global Water Instrumentation, Inc., Gold River, California, USA). Additionally, daily average Salinas River flows (cubic feet per second; cfs) were downloaded from the United States Geological Survey (USGS) "Waterwatch" website (http://waterwatch.usgs.gov).

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APPENDIX B: PROTOCOL FOR ROTARY SCREW TRAP OPERATIONS

Trapping Site Selection and Installation

FISHBIO personnel have found that the water depth should clearly exceed the radius of the cone, with a current velocity of at least 1.5 ft/s for the trap to operate effectively. Thus, RSTs are commonly positioned in the thalweg of the river channel where water velocities are greatest (Thedinga et al. 1994). When selecting a trapping site, it is important to consider the typical hydrograph of the stream under study, since many streams may experience large changes in flow over relatively short periods of time.

In order to ensure a consistent sampling record and avoid costly loss or damage of sampling gear, RSTs need to be secured using techniques appropriate for the sampling site. The two common methods used by FISHBIO are described below.

Method 1 - Overhead cable: The trap is held in place by a 3/8-inch overhead cable strung between two large trees (or a post if a second tree is not present) located on opposite banks. Cables fastened to the front of each pontoon are attached to the overhead cable.

Method 2 - Anchor: The trap is positioned and secured in place by one 50 lb plow style anchor (Delta Fast-Set model, Lewmar, Havant, UK). The anchor is connected to the RST by 3/8-inch stainless steel cables via a yoke-style cabling system (resembling a "Y" shape), whereby, each end of the yoke is attached to the front of a pontoon. The downstream force of the water on the traps keeps the cables taut.

Backup and Safety

To prevent the traps from floating downstream should the anchor or overhead cable fail, all traps are equipped with a backup cable that is connected to the downstream side of the trap and secured to suitable structure (e.g. a tree) on the shore.

As RSTs may present a navigational hazard, flashing lights and flagging are placed on the traps and along the cabling to increase visibility. As an additional safety precaution, warning signs are posted at each trapping location to inform people of the inherent dangers and risks of injury posed by unauthorized handling of the RSTs.

Trap Monitoring and Maintenance

When the trap is not sampling for a short period (several days), the funnel of the RST is raised, preventing fish from entering the structure and becoming trapped. If sampling is interrupted for extended periods of time, the trap is removed from the river.

While in operation and regardless of trapping location, traps are checked at least once daily (generally in the morning), with additional maintenance and checks conducted as conditions require (e.g. during periods of peak migration, high flows, or high debris loads). During each trap check the contents of the liveboxes are removed and fish are

anesthetized for safe handling (Tricaine-S, Western Chemical Brand, Ferndale, WA). All fish are then identified to species, counted, and any marked fish are noted. In addition, subsamples for species of special interest are selected for further data collection in conformance with site-specific collection protocol. These fish are measured to the nearest millimeter (fork length, FL) and weighed (to nearest tenth of a gram) in a small, plastic container partially filled with stream water, which is tared prior to weighing each fish. Trout are assigned to a lifestage category based fork length (Table B-1), and, if applicable, a smolt category based on a seven category scale (Table B-2). Fish are then placed in a container with freshwater and allowed to recover before release.

Table B-1. Life stage categories for rainbow trout/steelhead (*O. mykiss*) based on forklengths.

O. mykiss	<100 mm	young-of-the-year (YOY)
	100-299 mm	one year old or older (Age 1+)

Table B-2. Smolting appearance of all measured trout are rated based on a seven-category scale (Interagency Ecological Program, unpublished).

Smolt Categories	1	yolk-sac fry
	2	fry
	3	parr
	4	silvery parr
	5	smolt
	6	mature adult
	IAD	Immature adult

Following the processing, recovery and release of captured fish, traps are cleaned to prevent accumulation of debris that might impair trap rotation or cause fish mortality within the livebox. Trap cleaning includes removal of debris from all trap surfaces and from within the livebox. The amount of debris load in the livebox is estimated and recorded whenever traps are checked.

In addition, several measurements are taken to ensure proper positioning of the trap, proper trap function, and – if necessary – to estimate how long a trap operated effectively if it prematurely stopped (e.g., log jam).

- Instantaneous water velocity in front of the trap funnel (Flow Probe,Global Water, Model FP101, Gold River, CA).
- Number of rotations the funnel made in a 24 hour period (counted using a mechanical counter (Redington, Windsor, CT) mounted to the pontoon.
- Average daily trap rotation speed (estimated by recording the time (in seconds) for three continuous revolutions of the cone prior to and after the morning trap cleaning).

Environmental Variables

A number of environmental variables are recorded daily

- Instantaneous turbidity: measured in Nephelometric Turbidity Units (NTU) using a turbidity meter (LaMotte, Model 2020e, Chestertown, Maryland).
- Instantaneous water temperature and dissolved oxygen (DO): recorded using a

DO meter (Exstick II model DO600, Extech Instruments Corporation, Waltham, MA)

- Instantaneous conductivity: recorded using a conductivity meter (ExStik II model EC500, Extech Instruments Corporation, Waltham, MA).
- Daily average water temperature: calculated from hourly water temperature data that are logged using a submersible data logger (Hobo Water Temp Pro V2, Onset Computer Corporation, Pocasset, MA).
- Average daily flow data: downloaded from U. S. Geological Survey (USGS), California Data Exchange (CDEC) or U.S. Army Corps of Engineers (USACE) gauging stations. Gauging stations for each trapping location are provided in the site specific appendices.

Estimating Trap Efficiency

As the RST only samples a fraction of the flow at any given time, and factors such as high flow, low turbidity, fish size and noise can reduce the efficiency of the RST (Volkhardt et al. 2007), the fraction of fish caught by the trap needs to be estimated. To obtain an estimate of trap efficiency, a know number of marked fish are released upstream of the RST. The fraction of marked fish recovered in the trap is indicative of the proportion of all migrating fish (under identical conditions) and can be used to estimate total abundance of individuals migrating downstream.

Whenever catches are sufficient to obtain a group of a pre-determined size (over no more than two days), naturally reared juveniles (rather than those of hatchery origin) are used to conduct these tests. If numbers caught at the trap are insufficient to estimate efficiency, fish may be obtained at a hatchery and transported to the trapping site.

Marking Procedure

To identify individuals belonging to the group released for estimation of trap efficiency, FISHBIO uses a photonic marking system (Day-Glo Color Corporation, Cleveland, OH). The fish are temporarily anesthetized (using Tricaine-S) and a marking gun uses compressed air to force a small amount of dye into the fish's fin tissue. Very little dye is actually injected into the fin tissue, leaving only a small mark that can be seen with careful examination of the fish. The dye is temporary and experiments have shown that it does not substantially affect fish health or survival. Use of this photonic marking technique allows for rapid application of marks to large numbers of individuals, and use of different colors and mark locations makes it possible for biologists to distinguish between release groups. Although the dye initially appears quite bold, it quickly fades to a faintly colored mark.

Naturally produced juveniles are marked onshore immediately adjacent to the traps and are then transported to the upstream release sites where they are held until release. Hatchery produced fish may be marked at the hatchery and then transported to the release site.

Holding Facility and Transport Method

Once fish are marked, they are transferred from liveboxes into either 5-gallon buckets or 20-gallon insulated coolers (depending on the quantity of fish, temperature, and distance traveled), and are transported by boat or truck upstream to the release sites. Release locations are generally 0.2 to 0.5 miles upstream of the trapping site, selected to be located far enough upstream to allow for an even distribution of marked fish, yet close enough to the trap to minimize predation of marked fish between release and recapture (Volkhardt et al. 2007).

Fish are held in livecars in the river for several hours to ensure full recovery prior to release. Livecars are constructed of 15" diameter PVC pipe cut into 34" lengths, with a rectangular window (approximately 6"x 23") covered with aluminum or stainless steel mesh to allow for adequate water circulation. Livecars are tethered to vegetation or other structures in areas of low water velocity to reduce fish stress.

Pre-release Inspection

Prior to release, marked fish undergo a second visual inspection to ensure proper mark retention. To help visualize the dye, the fish is placed on a black background and illuminated with an ultra violet light. Fifty fish (or the entire release group if fewer than 50 fish) are randomly selected from each release group, anesthetized, and examined for marks; the remaining fish (if any) are counted. If more than two fish are observed without a mark, the entire group is sorted and any fish without a mark are removed from the group and not included in the total count.

Release Procedure

All marked fish are released just after sunset when most juvenile salmon are actively migrating. Fish, after being transferred from the livecars to buckets, are scooped from the bucket with a dip net and released into the river. After releasing a batch of fish, a delay of about 30 seconds to 3 minutes allows the fish to disperse naturally prior to the release of the next group. Total release time for marked groups normally ranges from ten minutes to 30 minutes depending on the group size.

Recapture Procedure

Following release of marked individuals, RSTs are checked at one-hour intervals and all fish are examined for marks to determine the proportion of recaptures. The number of times the trap is checked is dependent upon the number of marked fish recovered from the livebox. Generally, the traps are checked a minimum of two times or until the no marked individuals are recaptured during a trap check.

Trap efficiency (T_i) is estimated as follow:

$$T_i = \frac{C}{R} \qquad \text{(Equation 1)}$$

where C is the number of marked fish that were recaptured, and R is the total number of marked fish that were released.

Increasing Trap Efficiency

To sample a greater fraction of the flow, two RSTs can be set up side-by-side in a tandem configuration. Whether single or tandem traps are used depends on the characteristics of the trapping location; narrow river channels can be sampled effectively with a single RST, whereas a wide river may warrant a tandem configuration to increase capture efficiency. Tandem traps are fastened together side-by-side with ½-inch Ultra High Molecular Weight (UHMW) plastic strips that are bolted to the adjacent pontoons of both RSTs at the cross-bars.

In certain situations "wings" may be attached at 45-degree angles to the outer edge of each pontoon near the upstream end of the trap to increase current velocity at the trap and to improve catch efficiency. The "wings" consist of 4 ft x 4 ft aluminum frames with removable plywood inserts. An additional structure (built from plywood sheets and attached to t-posts set in the river bed) may be positioned in the river at appropriate angles to deflect more water towards and thereby increase current velocity at the traps.

Abundance Estimates

For estimation of abundance from RST samples, daily salmonid catch is equivalent to the number of salmonids captured during a morning trap check plus the number of salmonids captured during any trap check(s) that occurred within the period after the previous morning check. For example, the daily catch for April 10 is the sum of catch from the morning trap check on April 10 and the evening trap check conducted on April 9. Separate daily catch data are maintained for marked and unmarked salmonids.

Clearly, as RSTs only sample a fraction of the in-river flow, only a percentage of the total number of downstream migrants is captured. Although many factors can affect the actual fraction of fish captured, flow is the primary variable affecting salmonid trap efficiencies.

A variety of approaches can be used to estimate abundance, depending on the type of data available. Total abundance estimates may incorporate estimates of trap efficiency, predictive models thereof (incorporating flow, fish size and turbidity), or rely simply on the proportion of flow sampled by the RST.

In general, for the purposes of reports submitted by FISHBIO, annual total abundance ($\hat{Y}$) is defined as the sum of all daily abundance estimates for the entire trapping season:

$$\hat{Y} = \sum_1^i \hat{y}_i \qquad \text{Equation (2)}$$

where $\hat{y}_i$ is the total abundance estimate for day i.

No Trap Efficiency Estimates

In some instances trap efficiency tests cannot be conducted due to insufficient catch. In those cases, relative abundance is estimated by expanding the number of fish captured in the fraction of river flow passing through the trap to the total river discharge. The proportion of flow (P_i) sampled by the trap is calculated for day i, as follows:

APPENDIX C: PROTOCOL FOR ELECTROFISHING OPERATIONS, HABITAT MAPPING AND SNORKEL SURVEYS

Electrofishing Depletion Surveys

Electrofishing depletion survey methods will generally follow the methods used during past Arroyo Seco and Nacimiento River electrofishing surveys: two or three backpack electrofishers (model LR-24) will be used (depending on site characteristics) and six people (three to four netters and two to three electrofisher operators) will be utilized. Block nets will be positioned at the upstream and downstream ends of the selected sampling site. Fish recovery buckets will be placed in short intervals along the riverbank. Electrofishing will be performed with all persennel moving simultaneously from downstream to upstream, staying in a straight line perpendicular to the river flow. Fish are netted and transferred to the buckets. Fish are processed after each electrofishing pass. A minimum of three electrofishing passes will be made with passes continuing until the target depletion is reached.

Captured *O. mykiss* will be anesthetized, checked for any external marks/tags and overall health, and measured for length and weight. Smolt indices will also be recorded according to a rating scale developed by IEP (rating from 1-5), with a score of 1 representing a yolk-sac fry; 2, a fry; 3, a parr; 4, a silvery parr; and 5, a smolt. Digital photographs will be taken of each steelhead captured. Scale samples will be archived and can be used at a later date by MCWRA or other researchers to identify age, growth, and genetics. All non-steelhead fish species (incidentals) will also be counted and measured for length and weight.

Environmental data will be collected at each site including instantaneous point measurements of water velocity, water temperature, turbidity, dissolved oxygen, and salinity and digital photographs will be taken to document how site conditions change.

Water velocity will be measured with a Global Water flow probe. Turbidity will be measured at the trap in nephelometric turbidity units (NTUs) using a LaMotte turbidity meter, which is more accurate than Secchi readings. Instantaneous water temperature, dissolved oxygen and salinity will be measured using Extech meters.

We intend to employ the same analysis methodology used in previous survey seasons, whereby population estimates were calculated using an iterative maximum-likelihood approach for each site. MicroFish 3.0 (Van Deventer 2006) was used as a tool to calculate population estimates, standard errors and 95% confidence intervals (MCWRA 2012). Past population estimates were restricted to the sampled areas, and were only an index of the overall population.

$$P_i = \frac{V_i * (\pi * \frac{r^2}{2})}{F_i}$$ Equation (3)

where, V_i is the daily velocity measured at the mouth of the trap, r is the radius of the trap, and F_i is the average daily flow measured at the respective gauging station.

To estimate the daily total abundance ($\hat{y}_i$) of fish migrating downstream, the number of fish caught during a 24-hour period (x_i) is divided by the proportion of flow sampled in the 24-hour period.

$$\hat{y}_i = \frac{x_i}{P_i}$$ Equation (4)

Abundance Estimates Incorporating Trap Efficiency

When estimates of trap daily efficiency ($\hat{E}_T$) exist, this value is substituted for the proportion of flow that is sampled by the RST, and daily abundance is estimated as

$$\hat{y}_i = \frac{x_i}{T_i}$$ Equation (5)

Predictive Models of Trap Efficiency

As long term data sets become available, encompassing estimates of trap efficiency for a variety of environmental conditions (e.g. flow, fish size, turbidity), the relationship between these predictor variables and trap efficiency is investigated using regression analysis. Resulting predictive relationships are used to estimate trap efficiencies for given environmental conditions, and applied to the catch data for the respective day. Details on predictive relationships (if applicable) between environmental variable and trap efficiency as pertinent to various rivers can be found in the Appendices.

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Habitat Mapping

We plan to use the same sample units on the Arroyo Seco River that were selected during the previous survey seasons. However, due to difficulties encountered on the Nacimiento River during the previous survey seasons we plan to identify some new sites at upstream locations that were not previously investigated due to accessibility. Prior to conducting Arroyo Seco River index-reach surveys we will validate the selected sites for proper habitat type and area coverage.

As an alternative protocol for sample site selection, the procedure outlined below may be implemented as applicable:

Habitat accessible to anadromy in each river will be stratified into reaches depending on the overall habitat characteristics and relevant access points. Each reach will be subdivided into habitat units based on a four-category classification (i.e. riffle, run, shallow pool, deep pool, cascade). During habitat mapping, the river will be surveyed on foot by kayak. GPS waypoints will be taken at the unit boundaries of each habitat unit using a hand held Trimble® GPS unit (Trimble Navigation Limited, Sunnyvale, CA), in order to accurately locate each habitat unit during subsequent visits. In addition, the length of each unit will be measured with a rangefinder and recorded, as this measurement will become integral in the subsequent sample selection procedure. Mapping notes will include: the date, flow, reach, unit number, habitat type, length and average width of each habitat unit, and any landmarks near or within the unit. During the initial habitat mapping, habitat units that appear to pose potential hazards to snorkelers or are otherwise unsuitable for the proposed survey type will be identified. These units, while included in subsequent fish abundance estimation based on their lengths, will be excluded from survey unit selection.

Habitat mapping will occur once on each river at the start of the study. Minor changes to the physical habitat of units will be noted during the annual snorkel surveys. In some unusual cases considerable changes in the physical habitat can occur over time due to large winter storms and construction. If such events occur, then the affected habitats will be revisited and remapped.

Sample Unit Selection

For each tributary, sampling coverage should be a minimum of 15% of the rivers' lengths. This 15% will be allocated between different habitat types, with higher sampling effort in habitats preferentially inhabited by *O. mykiss*. This is intended to minimize sampling variance for habitats with high abundance (2^{nd} Stage Error) and ultimately allow for narrower confidence intervals than would otherwise be possible.

Within each reach and stratum (as defined by habitat type: run, riffle, deep pool, shallow pool, cascade), sampling units will be selected using an unequal probability sampling scheme that selects units with a probability proportional to their length/size (without replacement, PPSWOR). Stream sections classified as "cascades" are often hazardous

and will be excluded from this survey due to safety concerns. The probability of a particular unit i being selected can be expressed as

$$\pi_i = \frac{l_i}{L}$$

where

l_i = is the length of unit i (in meters), and
L = the combined length of all units in this stratum.

This approach yields several important benefits; as longer habitat units have a higher probability of selection, cost and effort for travel to and between units can be reduced without sacrificing sampling coverage. Further, this approach allows for unbiased estimation of sampling variance, and is thought to improve precision of the abundance estimate over equal probability sample selection, if abundance estimates for particular units are positively correlated to unit length (a biologically reasonable assumption).

In order to facilitate the detection of trends in abundance (by employing difference estimators, more detail available upon request), sampling units will be selected during the first year of the study, and the same units will be surveyed in subsequent years.

Multi-pass Snorkel Counts

Although there are many methods for estimating the total abundance of fish in freshwater systems, the majority of the methods depend on handling the fish during enumeration (e.g., electrofishing, seining etc.). A viable alternative to obtaining accurate population size estimates by traditional methods (such as depletion electrofishing or mark-resighting experiments) is the Method of Bounded Counts (MBC). This approach relies on repeat counts of fish from the same unit (generally four passes), and produces nearly unbiased estimates of abundance if fish abundance in respective survey units is relatively low (Mohr and Hankin 2005). As such, this method provides a non-invasive (no fish handling required) alternative to traditional methods that is highly applicable to stream surveys involving species of special concern.

Each year, a single snorkel survey will be conducted at each of the selected rivers (at habitat units selected according to the above described procedure). Ideally, the surveys will be conducted in the summer, when size differences between Age 0+ and Age 1+ are most apparent. However, the exact timing will be determined annually depending on river conditions, and scheduled to minimize environmental variation between years. During each survey, a standardized protocol will be followed to ensure comparability of survey results and to minimize variation due to sampling error:

The number of divers needed for a snorkel survey will depend on the conditions and size of the stream, but will be chosen to ensure complete visual coverage of the stream during

upstream snorkeling. If the surveyed stream section requires more than two divers for complete visual coverage of the stream width, parallel dive lanes will be established prior to snorkeling. This is achieved by marking lane borders with white string, anchored to the river bottom at appropriate intervals. Whenever conditions allow, lane markers will be deployed without entering the unit to avoid disturbing and displacing fish. This is achieved by stretching the marking string along the shoreline of the survey unit, then entering the stream at the boundaries of the survey unit with the string above water level and anchoring it at the appropriate positions. Survey units will be allowed to rest for a period of 15 minutes following dive lane demarcation. Dive lanes will be randomly assigned to divers at each survey unit to minimize the effects of diver familiarity with the physical habitat and fish population on dive counts.

Care will be taken to minimize disturbance of fish prior to sampling each unit. Divers will enter the stream at the downstream border of the survey reach and count fish within their respective dive lanes as they proceed upstream. Divers will record fish counts on a wrist mounted dive slate, and assign a size category to each observation (less than 100mm, 100-200mm, 200-300mm, and greater than 300mm). To facilitate the correct estimation of fish size by the divers, they will carry a reference string knotted at 100mm intervals. When approaching the upstream boundary of the survey unit, divers will carefully monitor fish holding close to the unit boundary and include fish that cross the unit boundary upstream. Any fish that appear to move between lanes will be discussed immediately after the dive to avoid multiple counts of the same fish.

As obtaining accurate counts of *O. mykiss* is the priority of this survey, other observed species (and their lengths) will be recorded only if doing so does not compromise counts of *O. mykiss*.

The following environmental data will be collected at each sampling unit:

- Instantaneous water temperature and dissolved oxygen (DO, Exstick II model DO600, Extech Instruments Corporation, Waltham, MA)
- Visibility (defined as the horizontal distance at which a diver can clearly discern a 100 mm artificial trout)
- Weather (see Figure 1 for datasheet example).
- Flow (in cfs, obtained from the nearest USGS gauge)

Estimated Indices of Abundance by Habitat and Life Stage

Within each habitat type, data for each size class can be pooled across reaches of the same river, assuming similar fish detectability among reaches. As the proposed survey design incorporates changes in dive lane width to accommodate for variation in visibility between survey units, this assumption is likely to be satisfied, and allows for an abundance estimate for each size class within each habitat category. This will provide an estimated abundance for each size class within a specific habitat type in that river.

Based on the selection of n samples within a stratum, the total number of countable fish within that habitat type can be estimated using a Horvitz-Thompson estimator (Cochran 1977; Sarndal et al. 1992) as

$$\hat{Y} = \sum_{i=1}^{n} \frac{y_i}{\pi_i}$$

where
$\hat{Y}$ = the estimated total number of fish within that habitat type
y_i = the count of fish in the ith sample unit within that stratum
π_i = the probability that unit *i* appears in a PPSWOR sample of size n (1st order inclusion probability)

The sampling variance for the Horvitz-Thompson estimator, for fixed sample size *n*, can be estimated using the Sen-Yates-Grundy variance estimator (see Cochran 1977; Samdal et al. 1992) as

$$\hat{V}(\hat{Y}) = \sum_{i=1}^{n-1} \sum_{j>i}^{n} \frac{(\pi_i \pi_j - \pi_{ij})}{\pi_{ij}} * \left[\frac{y_i}{\pi_i} - \frac{y_j}{\pi_j}\right]^2$$

where
π_j = the probability of unit *j* to be included in the PPSWOR sample of size *n*
π_{ij} = the probability of units *i* and *j* to be included in the PPSWOR sample of size *n* (2nd order inclusion probability)

The 95% confidence interval for the estimated total ($\hat{Y}$) can be calculated by multiplying the appriprite students *t*-value for *n*-1 degrees of freedom by the square root of the estimated sampling variance ($\hat{V}$)

$$95\%\ \text{C.I.} = \hat{Y} \pm t_{n-1} * \sqrt{\hat{V}(\hat{Y})}$$

Additional detail and procedures regarding calibration of single pass dive counts and the Method of Bounded Counts are available upon requests.

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EXHIBIT B

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Task 1. Adult Upstream Migration															
Sub-Task 1.1 Project Planning	X	X	X												
Sub-Task 1.2 Istallation, Operation, and Removal				X	X	X	X								
Sub-Task 3.3 Data Management and Reporting								X	X						
Task 2. Smolt Outmigration Monitoring															
Sub-Task 2.1 Project Planning					X	X									
Sub-Task 2.2 Istallation, Operation, and Removal							X	X	X						
Sub-Task 2.3 Data Management and Reporting										X	X				
Task 3. Adult Upstream Migration															
Sub-Task 3.1 Project Planning								X	X	X					
Sub-Task 3.2 Conduct Index-Reach Surveys											X	X	X	X	
Sub-Task 3.3 Data Management and Reporting															X

Figure 1. Work schedule for Salinas Basin fisheries monitoring.

Table 1. FISHBIO schedule of 2012 hourly billing rates.

Position	***Hourly Rate***
Principal Biologist	$ 180.00
Quantitative Ecologist	$ 160.00
Senior Biologist	$ 160.00
Biologist 3	$ 150.00
Biologist 2	$ 130.00
Biologist 1	$ 115.00
Graphical Design	$ 115.00
Bio-Technician 2	$ 85.00
Bio-Technician 1	$ 75.00
Office Assistant	$ 50.00

	Projected Hours						
	Principal	Project Manager	Biologist	Technician	Database/GIS Specialist	Mileage	Estimated Cost
	$180	$130	$115	$85	$130	$0.555/mi	
Task 1. Adult Upstream Migration Monitoring							
1.1 Project Planning	5	5					$1,550
1.2 Weir and Riverwatcher Installation, Operation, and Removal	5	25		1410		4500	$126,498
1.3 Data Management and Reporting	5	80	40	180	10		$32,500
						Sub-Total	$160,548
Task 2. Smolt Outmigration Monitoring							
2.1 Project Planning	5	5					$1,550
2.2 RST Installation, Operation, and Removal	5	20		1512		9750	$137,431
2.3 Data Management and Reporting	5	80	40	115	5		$26,325
						Sub-Total	$165,306
Task 3. Index-Reach Surveys							
3.1 Project Planning	5	5	5		5		$2,775
3.2 Conduct Index-Reach Surveys and Associated Activities		30	40	400		800	$42,944
3.3 Data Management and Reporting	5	40	30	10	5		$11,050
						Sub-Total	$56,769
Task 4. On-Call Services	TBD	TBD	TBD	TBD	TBD	TBD	TBD
						Year 1 Total Estimated Cost	$382,623