

Quality Assurance Tools for Instream Flow

Watershed Health Indicator and Data Science Symposium; June 30, 2017

William S. Hagan¹ (Presenter), Beverly H. van Buuren¹, and Robert W. Holmes²

¹Quality Assurance Services

Marine Pollution Studies Laboratory at the Moss Landing Marine Laboratories

Moss Landing, California

Email: QAHelpDesk@mlml.calstate.edu

²California Department of Fish and Wildlife, Water Branch, Instream Flow Program

Sacramento, California



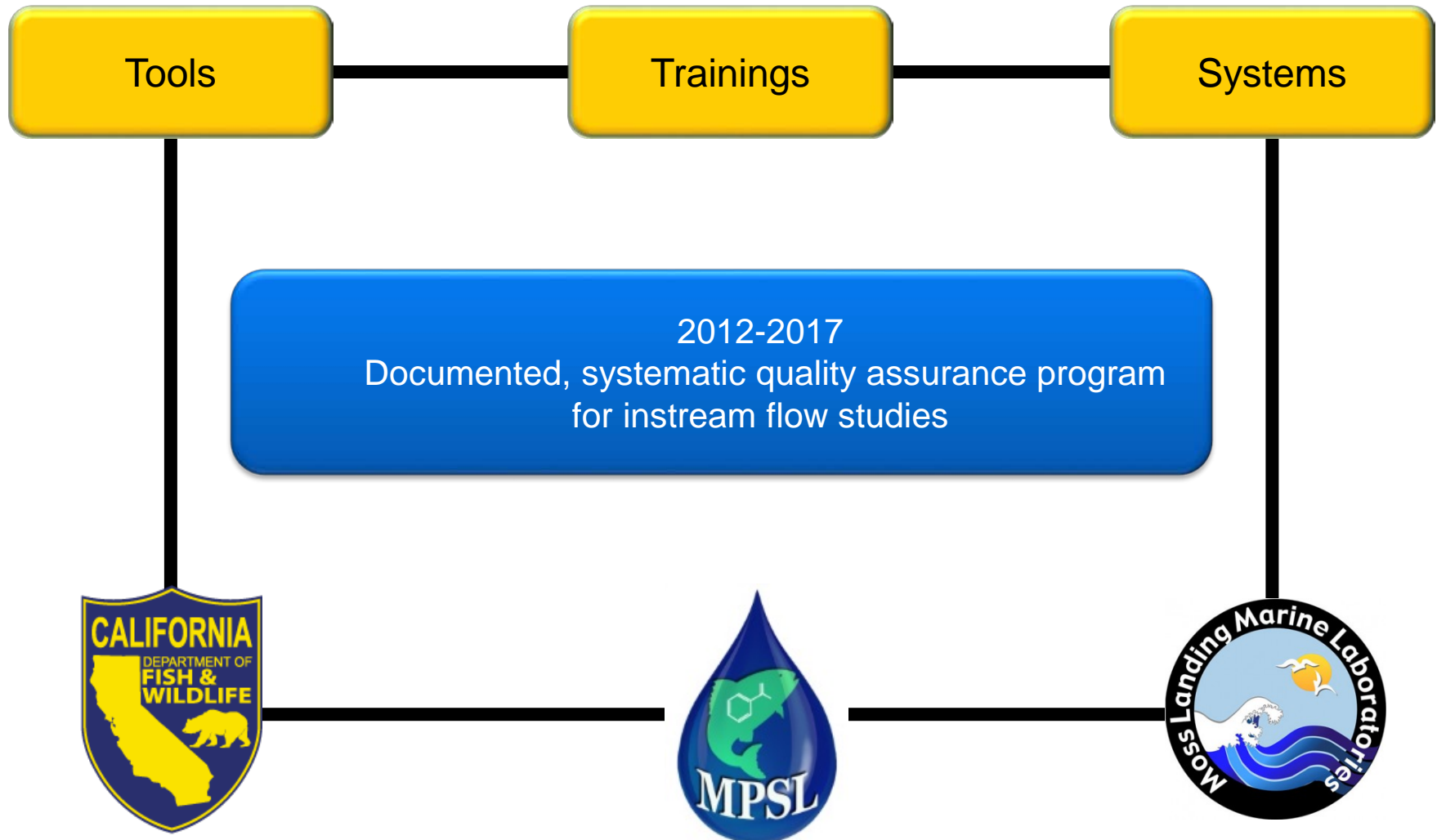
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Agenda

- CDFW Instream Flow Program/MPSL QA Services Group
- Instream flow study defensibility
- The CDFW Instream Flow Program QA system
- Importance of peer review
- Example studies: Big Sur River
- Conclusion



Collaborative Quality Assurance Program



Decisions and Recommendations

- *Fish and Game Code §5937*
 - Federal Energy Regulatory Commission (FERC) relicense evaluations (involves flow management near and below dams)
- *Public Resources Code §10000-10005 (Stream Flow Protection Standards)*
 - Decisions related to water allocation requests
- *California Senate Bill X7-1 (2009)*
 - Identification of streamflow needs for Delta tributaries
- *California Proposition 1 Water Bond (2014)*
 - Includes funding activities to support enhanced streamflow for fish and wildlife; this is critical in our current drought situation



CDFW Instream Flow Program QA System

- Standardized data collection procedures
- Technical guidance documents
- Study plan template
- Study results checklist
- Fact sheets
- In-person (and in-field) training courses

wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/SOP



Standard Operating Procedure for Critical Riffle Analysis for Fish Passage in California

DFG-IFP-001

October 2012, Updated February 2015



Standard Operating Procedures

California Department of Fish and Game
Instream Flow Program
Sacramento, California



CALIFORNIA DEPARTMENT OF
FISH and WILDLIFE



INSTREAM FLOW PROGRAM

Mesohabitat Delineation Guidance for Instream Flow Hydraulic Habitat Analysis

Guidance Documents

The specific objective of mesohabitat delineation is to create a computer spreadsheet database and summary of all mesohabitat unit characteristics by type and distance within designated reaches of the river and tributaries of interest.

To Identify Mesohabitat Types for Inclusion into Hydraulic Habitat Sampling and Analysis:

Step 1: Segment the river and tributaries of interest into generally homologous study reaches using criteria such as hydrology, geomorphology, and gradient. The study areas for mesohabitat delineation encompass those mainstem and tributary reaches proposed for assessment using hydraulic habitat modeling methods or related studies. Mesohabitat delineation should be conducted under flow conditions when mesohabitat types are readily apparent. Excessively low or high flows should be avoided when conducting mesohabitat delineation.

Step 2: The preferred delineation approach is by on-the-ground surveys, consisting of identification of habitat types using specified level-IV typing criteria (Flosi et al 2010). Measurements of habitat unit lengths, channel widths, water depth, and identification of other features (e.g., access points, road crossings, bridges, culverts, and any stream bank alterations) are also necessary to acquire a complete inventory of existing mesohabitat conditions. If aerial images are used, on-the-ground validation is required.



Continued on Next Page...



[Program Name]
Instream Flow Study Plan Guidance and Template
Month xx, 201x

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5. Procedures and Protocols

5.1 Stream Survey and Habitat Mapping Procedures and Protocols

This section identifies and summarizes the procedures to be used for stream surveys and habitat mapping. In addition to a written summary of procedures, method information can be

5.2 Field Data Collection Procedures and Protocols

This section identifies and summarizes procedures to be used for field data collection for hydraulic habitat models and/or empirical methods. It should include coverage of associated equipment, preservation, holding times, and corrective actions. In addition to a written summary of procedures, method information can be summarized in a table for quick reference.

Table X: Field Data Collection Procedures and Protocols

Method	Version#/Date	Author/Organization

5.3 Modeling and Empirical Flow vs. Habitat Procedures and Protocols

This section identifies and summarizes:

- Hydraulic model(s) and empirical methods proposed for the study (may be presented in a table format)
- The appropriateness of the model(s) and methods to address study goal
- Calibration methods and procedures (i.e., bed roughness and transmissivity calibration procedures; model performance; identification of data outliers in calibrated models; selection of model simulation flows; bed surface development; mesh development; rating curve development; hydraulic calibration; simulation results).

Templates

California Department of Fish and Wildlife

INSTREAM FLOW PROGRAM

MONTH 201X UPDATE

What is a Low-Flow Threshold?

A low-flow threshold identifies where flow levels are receding into the "danger zone" for aquatic life (DFO 2013). These are survival-level flows and definitely not "optimal" ecological flows. For example, the breakpoint flow level identified by a ≥50% wetted perimeter on a wetted perimeter vs. discharge curve identifies the lower ecosystem threshold flow, below which aquatic invertebrate production, habitat, and general ecological health rapidly decline (Annear et al. 2004).

What are the Benefits of Low-Flow Thresholds?

A seasonally appropriate low-flow threshold helps protect fishery productivity during critically low-flow time periods by supporting stream channel forms and riparian communities that directly affect aquatic life (Annear et al. 2004).

Fact Sheets



Department of Fish and Wildlife Water Branch Instream Flow Program

How to Use the Study Plan Template



Beverly H. van Buuren

Quality Assurance Team at the Marine Pollution Studies Laboratory
Moss Landing Marine Labs, Moss Landing, CA

Instream Flow
Study Design and Execution Training
June 30, 2016 Sacramento, CA



Slide 1

Trainings



Instream Flow Study Design and Execution

June 30, 2016, 8:30 AM – 4:30 PM
California Department of Fish and Wildlife
Office of Training and Development (Sacramento, CA)



Agenda

8:30 AM Welcome and Introductions

8:50 AM Overview of Quality Assurance Concepts (MPSL - van Buuren)

9:05 AM Common Methods and Models for Developing Flow Criteria (CDFW - Haas)

9:30 AM Western Region Fish and Wildlife Agency Methods (CDFW - Constantinedes)

9:40 AM Instream Flow Study Design Considerations (CDFW - Holmes)

10:00 AM Study Design Quality Assurance and Logistics (MPSL - van Buuren)

10:30 AM Break

10:50 AM Methods and Models (CDFW)

- Flow Duration Analyses, Percentile-Based Flow Criteria (Drescher)
- Q_b and Hatfield Bruce Regression Equations (Maher)
- Critical Riffle Analysis (Carlin)

12:00 PM Lunch

1:20 PM Methods and Models (CDFW *continued*)

- Habitat Retention Method (Hwan)
- Wetted Perimeter Method (Ingrassia)
- Geomorphology/Water Quality (Cowan)

2:20 PM Group Exercise

2:50 PM Break

3:10 PM Importance of Linking Hydrology, Available Resour

3:30 PM Final Report: Quality Assurance Considerations (M

3:50 PM Group Discussion

4:05 PM Wrap Up



What is a Study Plan?

A formalized planning document that details the future study's:



- Objectives
- Personnel
- Logistics
- Procedures
- Quality assurance
- Data management

Without a study plan, there is nothing to peer review!!!



Benefits of Peer Review

- Confirms scientific defensibility
- Promotes coordination and transparency among technical flow experts
- Builds inter-agency trust and support for flow studies and results
- Strengthens historical data and information



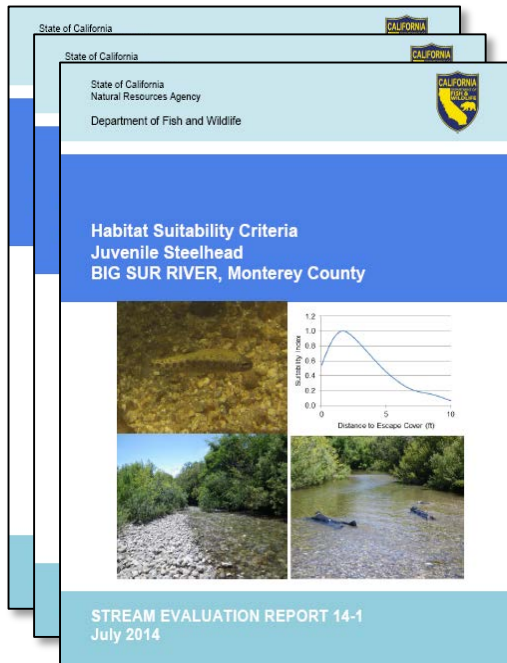
Scope of Peer Review

- Sampling sites
- Utilized methods
- Model calibration
- Statistical performance
- Coverage of the core riverine components*
- More?

*Annear, T., I. Chisholm, H. Beecher, A. Locke, and 12 other coauthors. 2004. *Instream Flows for Riverine Resource Stewardship, Revised Edition*. Instream Flow Council, Cheyenne, WY. 268 pp



Big Sur River: Technical Reports



Habitat Suitability Criteria; Juvenile Steelhead; Big Sur River, Monterey County

Stream Evaluation Report 14-1, July 2014

Instream Flow Evaluation Steelhead Spawning and Rearing; Big Sur River, Monterey County

Stream Evaluation Report 14-2, July 2014

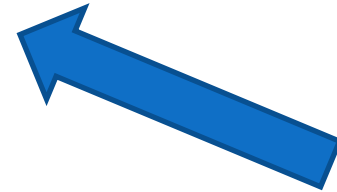
Instream Flow Evaluation Steelhead Passage and Connectivity of Riverine and Lagoon Habitats; Big Sur River, Monterey County

Stream Evaluation Report 14-3, July 2014

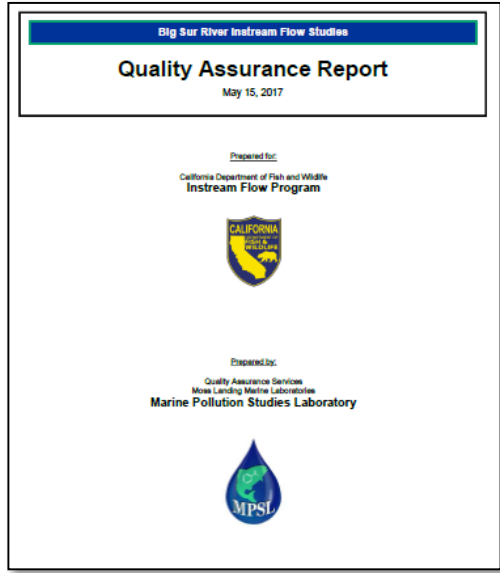
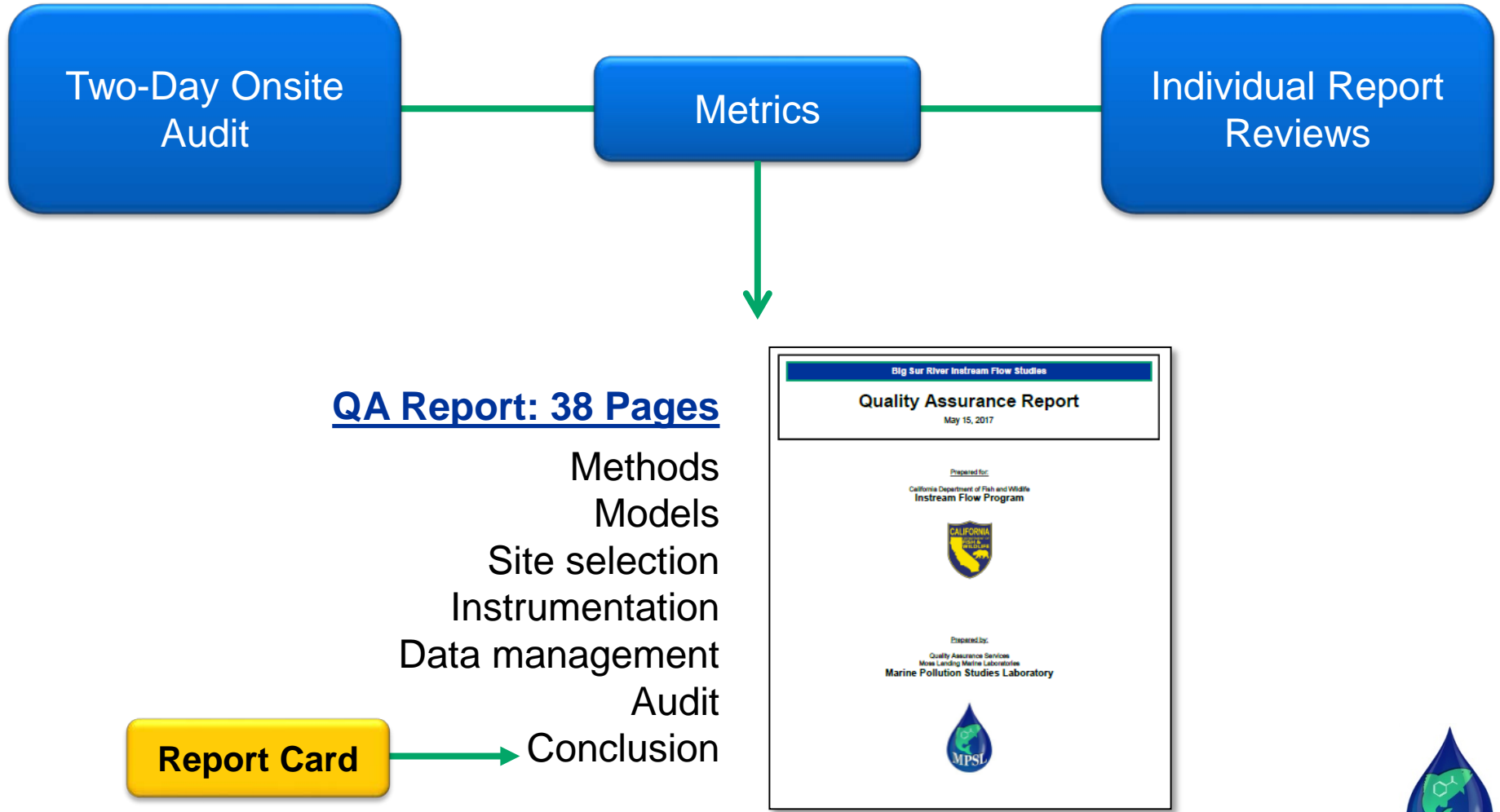


Big Sur River: Relevant Code

- *Fish and Game Code §5937*
 - Federal Energy Regulatory Commission (FERC) relicense evaluations (involves flow management near and below dams)
- *Public Resources Code §10000-10005 (Stream Flow Protection Standards)*
 - Decisions related to water allocation requests
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Big Sur River: QA Review Summary



Big Sur River: QA Review Findings

- Utilized procedures and models were appropriate for their intended use
- Utilized procedures were standardized and met or surpassed QA standards
- Model performance adhered to acceptable ranges and guidelines
- Data collection was appropriately documented
- Randomized study sites were statistically determined and confirmed in the field by representatives from CDFW, California State Parks, the Carmel River Steelhead Association, and the Source Group (for El Sur Ranch)

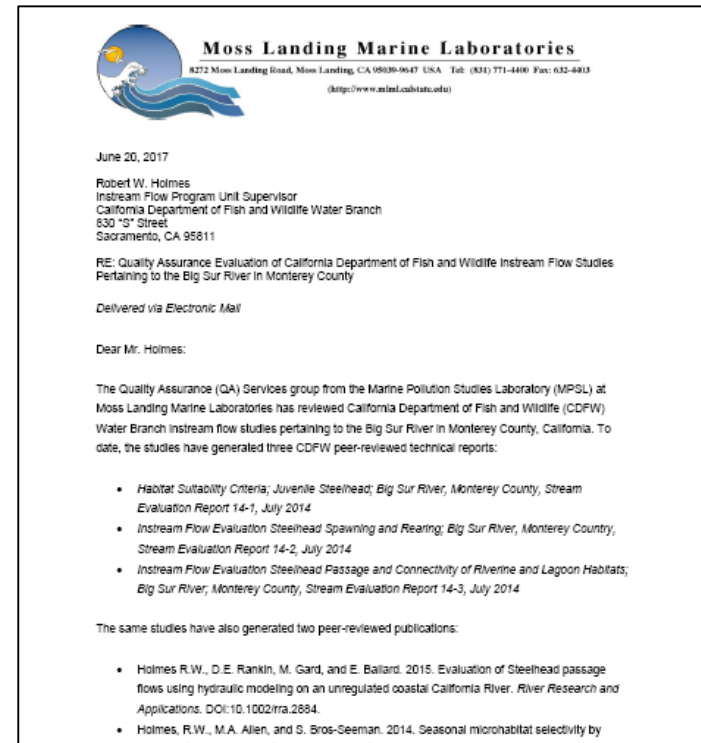
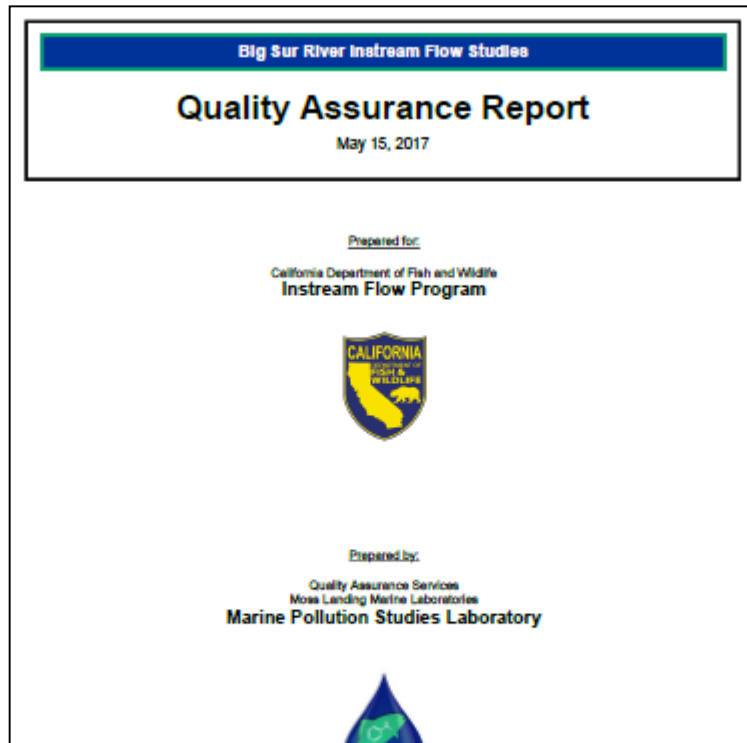


Big Sur River: QA Review Conclusion

Each of the three Big Sur River instream flow studies is appropriate for use in decisions pertaining to water allocation, fish and wildlife habitat, and Public Resources Code §10000-10005 (i.e., Stream Flow Protection Standards).



Big Sur River: QA Products



“The purpose of this letter is to substantiate our finding that these studies are appropriate to support decisions pertaining to water allocation, fish and wildlife habitat, and Public Resources Code §10000-10005 (i.e., Stream Flow Protection Standards).”



Final Thoughts



- Lack of detailed guidance/guidelines
- Degrees of defensibility
 - Applicable policies/codes
 - Study scale
- Peer review
 - Study plan
 - Technical reports



Marine Pollution Studies Laboratory

Moss Landing Marine Laboratories



William S. Hagan, Quality Assurance Specialist

whagan@mlml.calstate.edu

Beverly H. van Buuren, Quality Assurance Researcher

bvanbuuren@mlml.calstate.edu

206-297-1378

Questions?

QAHelpDesk@mlml.calstate.edu



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