

**STATE WATER BOARD STAFF RESPONSES TO COMMENTS  
RECEIVED FROM TROUT UNLIMITED, WAGNER &  
BONSIGNORE, AND ELLISON, SCHNEIDER & HARRIS  
ON APRIL 30, 2009**

**STATE WATER BOARD STAFF RESPONSES TO COMMENTS CONTAINED IN  
APRIL 30, 2009 JOINT RECOMMENDATIONS FROM TROUT UNLIMITED, WAGNER  
& BONSIGNORE, AND ELLISON, SCHNEIDER & HARRIS**

**JOINT RECOMMENDATIONS  
FOR THE  
NORTH COAST INSTREAM FLOW POLICY**

***Introduction***

*The conservation organization Trout Unlimited, the Wagner & Bonsignore water resource engineering firm and the Ellison, Schneider & Harris law firm jointly submit to the State Water Resource Control Board (State Water Board or Board) the following principles for a North Coast Instream Flow Policy (policy) to satisfy Assembly Bill 2121 (Kuehl 2004) and California Water Code section 1259.4.*

*This draft, dated April 13, 2009, contains recommendations for water right procedures and review standards for calculating bypass flows and rates of diversions. These principles and rationale expand upon our May 1, 2008 joint comment letter submitted on the Board's December 2007 Draft Instream Flow Policy. We consider the following set of shared principles, and the recommendations in the May 1 comment letter, to be mutually dependent, and we do not necessarily support each individual principle in the context of a policy that does not advance the other principles. (For example, TU cannot support these flow standards, or any others, without adequate monitoring and reporting, and W&B/ESH cannot support these flow standards, or any others, without improvements to water right processing.) We intend to submit more detailed recommendations based on the May 1 letter for other subjects shortly.*

***Update: April 30, 2009.*** The draft now includes new Section 1 (Introduction), Section 2 (Policy Framework), Section 3 (Policy Applicability), Section 6 (Watershed-Based Approaches), Section 7 (Stewardship Incentives), Section 8 (Compliance Monitoring and Reporting), and Section 9 (Regional Monitoring and Policy Effectiveness Review). The April 13 draft included Section 4 (Procedures), Section 5 (Standards for Calculating Bypass Flows and Rates of Diversion), and the Appendix "Guidance for Estimating  $Q_S$  and  $Q_{WLF}$ ." With one exception shown in "track changes" in Section 4, the material contained in the April 13 draft has not changed.

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## 1. Introduction

- 1.1. The policy establishes standards and procedures for the administration of water rights in the North Coast region as defined by A.B. 2121. The policy will be adopted by the State Water Board as a regulation as part of state policy for water quality control pursuant to Article 3 (commencing with Section 13140) of Chapter 3 of Division 7. The Board's Division of Water Rights (Division) will have primary responsibility for implementing the policy.
- 1.2. The policy implements, but does not modify, the Water Code and associated rules and regulations.
- 1.3. The policy is intended specifically to assist in review of water right applications and petitions that may affect anadromous fish resources, and to provide incentives for water right holders to undertake coordination and resource stewardship activities.

## 2. Policy Framework

**State Water Board Staff Response:** *The items listed are generally consistent with the Draft Policy and the revisions being developed by staff.*

- 2.1. The State Water Board will administer water rights within the Water Code's context of balancing multiple beneficial uses of water (including agricultural, municipal, domestic, industrial, and instream beneficial uses), protecting the public trust, and providing for water quality control.
- 2.2. The policy will be implemented to improve the efficiency, scientific and technical accuracy, and fairness of the water right process within the policy area.
- 2.3. The policy will promote compliance with the Water Code and other laws and regulations, and will encourage non-filers into the water right system.
- 2.4. The policy advances the Board's Strategic Plan objective to support a watershed-based framework to manage and protect water resources in order to satisfy competing environmental, land use, and water use interests by taking advantage of opportunities within a watershed, such as joint development of local solutions to watershed-specific problems, cost sharing, and coordination of diversions. The watershed framework will be hydrologically focused, recognize the linkages between water quantity and water quality, and require a comprehensive, long-term approach to water resources management that takes system interactions into account.
- 2.5. Diversions will generally be conditioned to a rainy season of diversion, to periods of high flows, to reasonably maintain the natural flow variability, to minimize to the extent practicable the effects of onstream dams, and to avoid significant cumulative effects. (Draft Policy Section 2.2.)

- 2.6. The policy provides incentives for existing water right holders with diversions that do not adhere to the principles stated in Section 2.2 to shift the manner and timing of their diversions consistent with those principles. In particular, the policy establishes incentives for existing diverters to shift to winter offstream storage as an alternative to summertime direct diversions.
- 2.7. The policy includes management objectives. (See Section 5 below.)
- 2.8. The policy allows compliance by one of three means: adherence to standard terms and conditions based on regional estimates of values sufficient to comply with the management objectives; completion of site-specific studies to calculate terms and conditions locally sufficient to comply with the management objectives; or participation in a watershed-based management framework under which groups of diverters conduct site-specific studies to establish stream flow performance measures sufficient to comply with the management objectives.

### **3. Applicability**

#### **Geographic Area Covered by the Policy**

The geographic area covered by the policy (policy area) includes all streams and tributaries discharging to the Pacific Ocean from the mouth of the Mattole River south to San Francisco, and all streams and tributaries discharging to northern San Pablo Bay. The policy area includes approximately 5,900 stream miles and encompasses 3.1 million watershed acres (4,900 square miles) in Marin, Sonoma, portions of Napa, Mendocino, and Humboldt counties, as indicated on Figure \_\_\_. Information from the USGS National Hydrography Database was used to create a list of named streams that are within the policy area. This list is provided in Appendix \_\_\_. The policy area includes these streams and unnamed and locally named streams that contribute flow to these streams. This policy does not apply to geographic areas outside of the policy area.

**State Water Board Staff Response:** Comment noted. This is generally consistent with policy section 3.2, which restates the geographic area described in Water Code section 1259.4. Staff declines to state the policy does not apply to geographic areas outside of the policy area as there are aspects of the policy that may be appropriately applied to other areas of California.

#### **3.2 Instream Biological Resources Covered by the Policy**

This policy establishes principles and guidelines for maintaining instream flows for the protection of native fishery resources in Northern California coastal streams. Many of the specific guidelines and criteria in this policy were developed based on the requirements of native anadromous salmonids present within the policy area. This policy focuses on instream flows that satisfy the needs of anadromous salmonids because these fishes are widely distributed across the policy area and because these instream flow requirements are generally protective of other native fishes and fish habitat. The principles and guidelines in this policy shall not apply where they conflict with the requirements for other instream biological resources, as discussed in Section 3.4.

**State Water Board Staff Response:** Staff is unable to provide a detailed response because section 3.4 was not provided by the commenter.

### **3.3 Water Right Actions Covered by the Policy**

This policy establishes procedures and criteria for evaluating the effects on instream resources associated with pending and new: applications to appropriate water; small domestic use registrations; livestock stockpond registrations; and long-term petitions to change existing permits or licenses that may result in reductions in streamflow at or below the existing point(s) of diversion. Elective provisions for holders of existing water rights (including permitted and licensed appropriative rights, pre-1914 appropriative rights, and riparian rights) are provided in Sections 6 and 7.

**State Water Board Staff Response:** Comment noted. The water right actions listed are generally consistent with Draft Policy section 3.3. Responses to the comments pertaining to Sections 6 and 7 of these Recommendations are provided in the corresponding section below.

#### **3.3.1 Exclusions from Policy**

**State Water Board Staff Response:** Staff declines to include a section in the policy containing exclusions as it would limit the State Water Board's discretionary ability.

This policy shall apply to the following water right actions only if the applicant, registrant or petitioner elects:

- pending applications, registrations, and petitions with draft water availability analyses or environmental impact analyses as of the date of adoption of this policy; or
- petitions to change existing water right permits and licenses effective for one year or less, e.g., petitions pursuant to Water Code section 1435 *et seq.* and section 1725 *et seq.*

#### **3.3.2 Applicability of Section 5 to Certain Petitions to Change**

Section 5 of this policy (standards for bypass flows, rates of diversion, season of diversion, and cumulative effects) does not apply to petitions to change permits and licenses that will not result in reduction of streamflow. For other petitions to change, Section 5 of the policy does apply, but its applicability is limited to reviewing or mitigating the adverse impacts associated with the change petition (not the underlying right).

Petitions that do not result in decreased streamflow but involve moving or adding an onstream dam (but not those that involve removing an onstream dam) shall comply with the Permitting Requirements for Onstream Dams contained in section \_\_\_\_].

**State Water Board Staff Response:** The above statements are generally consistent with the language contained in section 6.0 of the Draft Policy.

Special provisions for petitions for extension of time, diversions requiring an extended season of diversion including municipal and small domestic diversions, and direct diversions for frost protection are described in Section \_\_\_\_.

**State Water Board Staff Response:** Staff is unable to provide a detailed response because the commenter did not provide the special provisions that are referenced in the comment.

### **3.3.2 Applicability of Section 5 to Water Right Actions on Certain Streams**

Section 5 of this policy (standards for bypass flows, rates of diversion, season of diversion, and cumulative effects) was developed to address the native salmonid fishes, hydrology, and geography of the policy Geographic Area. The principles and guidelines of Section 5 shall be considered where appropriate but shall not be binding upon water right actions from the following streams:

- streams that do not support anadromous salmonids and that do not contribute streamflow to salmonid-bearing streams;
- streams bearing native instream biological resources whose requirements conflict with the requirements of anadromous salmonids; or
- streams or diversions for which the state board has adopted an order or decision balancing instream and non-instream beneficial uses.

All other sections of this policy, however, shall apply to such water right actions.

The principles and guidelines of Section 5 are not presumed to apply to other regions of the state.

**State Water Board Staff Response:** Comment noted. A technical evaluation of Section 5 is provided in Part B of this Addendum.

## **4. Review Procedures for Water Right Applications and Petitions**

**State Water Board Staff Response:** Although some of these suggestions have merit, they involve changes to the water rights administration process. This is outside of the context of establishing a policy for maintaining instream flows.

### **4.1. Application and Petition Processing**

This policy establishes new procedures for Division processing of water right applications, petitions, and registrations defined in Section [3.3]. Unless otherwise stated, this section shall refer generally to water right application, petition, and registration as “application”, and applicant, petitioner and registrant as “applicant”. The new procedures in this policy are consistent with and complimentary to existing procedures defined in the Water Code and Code of Regulations. An application process flow chart is provided in Exhibit XX. Separate strategies are provided for processing individual applications, for processing groups of applications within a geographic region, and for coordinated processing of applications within a watershed.

### **4.2. General Procedures Applicable to All New and Amended Applications**

#### **4.2.1. Project Scoping Conference for New and Amended Applications**

The applicant and Division staff shall have an early conference to discuss the scope of the application, the required environmental and water availability analyses, and the analytic methodologies for those analyses (within 60 days of application filing). This procedure shall apply to new applications and for amended applications.

#### **4.2.2. Application Work Plan**

The applicant and Division staff shall mutually develop a work plan within 60 days from the project scoping conference. The work plan shall delineate the major tasks necessary to process the application and clearly delineate the respective responsibilities of the applicant, the consultants, and Division staff.

#### **4.2.3. Early Consultation with Protestants and Responsible Agencies**

The applicant and SWRCB staff shall have an early consultation conference with protestants and responsible agencies to exchange basic information about the project and concerns with the project. Early consultation may occur through in-person meetings or telephone conversations. Applicants, protestants, and responsible agencies are encouraged to arrange a site visit and to confer regarding the application work plan.

### **4.3. Environmental Review Procedures Applicable to all Processing Strategies**

#### **4.3.1. Environmental Impact Analyses**

##### **1. Coordination of Environmental Analyses**

Applicants within a watershed shall coordinate the water availability, CEQA and/or public trust analyses where feasible.

##### **2. Impact Assessment Criteria and Study Guidelines**

Section 5 of policy establishes narrative criteria, numeric criteria, and study methodologies for salmonid resources. The Division shall develop guidelines for environmental impact analyses (including narrative criteria, numeric criteria where applicable and available and study methodologies) for non-salmonid resources including non-salmonid aquatic resources (such as amphibians and warm water fishes) and terrestrial resources, for assessing the effects of onstream dams, and similar resource issues.

A narrative criterion is a description of the desired biological or hydrological condition to be protected or impact to be avoided, such as the minimum stream flow necessary to maintain salmonid spawning below the point of diversion. The criteria should be tailored to address the specific features of projects within the region and the potential impacts caused by those projects. The criteria should function to screen smaller projects with lesser impacts into an expedited review process from larger projects with greater effects into a more involved evaluation process.

##### **3. Model Environmental Analyses**

The Division shall maintain a library of model environmental analyses that represent a reasonable range of water diversions (e.g., onstream storage, diversion to offstream storage, direct diversion, etc.), affected biological resources (e.g., salmonid fishes, non-salmonid fishes, amphibians, etc.), watershed size, and clear impact assessment methodologies or thresholds.

##### **4. Scale of Analyses**

The water availability, CEQA and public trust analyses shall consider relevant watershed-scale issues wherever possible.

#### **4.3.2. Options for Retention of Consultants for Projects Where the State Water Board is Lead Agency**

The State Water Board may employ one of the following arrangements or a combination of them for preparing a draft environmental analysis listed in CEQA Guidelines section (Cal. Code Regs., tit. 14, § 15084):

- (1) Preparing the draft environmental analysis directly with its own staff.
- (2) Contracting with another entity, public or private, to prepare the draft environmental analysis.
- (3) Accepting a draft prepared by the applicant, a consultant retained by the applicant, or any other person.
- (4) Executing a third party contract or memorandum of understanding with the applicant to govern the preparation of a draft environmental analysis by an independent contractor.
- (5) Using a previously prepared environmental analysis.

Before using a draft prepared by another person, the lead agency (State Water Board) shall, as required by the Guidelines, subject the draft to its own review and analysis. The draft environmental analysis which is sent out for public review must reflect the independent judgment of the lead agency. The lead agency is responsible for the adequacy and objectivity of the draft environmental analysis. (Cal. Code Regs., tit. 14, § 15084.)

Where a new environmental analysis is required and the State Water Board requires the cost of the analysis to be borne by the applicant, in most cases the applicant may elect to prepare a draft environmental analysis or contract with another entity to prepare the draft (option 3) or execute a memorandum of understanding (MOU) for preparation by an independent contractor (option 4).

The applicant may be required to enter into an MOU (option 4) where the project involves matters of significant policy, legal or technical concern for the State Water Board.

#### **4.4. Pre-decisional Review - Trial Program**

The Division shall establish a trial program that provides an opportunity for applicants and protestants to appeal to an appointed Member of the Board before final action on the application, petition or registration is taken by the Board on Division staff determinations including but not limited to following issues:

- Whether the diversion is from a natural watercourse subject to the permitting jurisdiction of the Board;
- Whether the project involves diversion of water subject to the permitting jurisdiction of the Board;
- Whether the application is subject to CEQA, or is subject to CEQA, but categorically exempt from further analysis;
- Whether a CEQA document satisfies the requirements of CEQA;

- Whether a water availability analysis satisfies the requirements of the Water Code and this policy;
- Whether a protest shall be accepted or rejected, or dismissed.

Where applicants and protestants have been unable to settle a protest by the time the Division is ready to make a decision on the proposed application, the Division shall provide them an opportunity to propose competing draft Division Decisions for the Division's consideration.

#### **4.4.1. Individual Application Processing<sup>1</sup>**

#### **4.4.2. Group Application Processing**

#### **4.4.3. Watershed Application Processing**

### **5. Review Standards for the Calculation of Bypass Flows, Rates of Diversion, Season of Diversion, and Cumulative Effects**

**State Water Board Staff Response:** Please see the technical evaluation provided in "Review of TU/WB/ESH Proposal", Stetson Engineers and R2 Resource Consultants, November 2009.

[Note: By the logic of the Draft Policy, the first 5 subsections that follow would go in Section 2 (Policy Framework) as a replacement for the Draft's Regional Criteria, and the rest would go in Section 4 (Water Right Applications), but for now it's together in one section.]

#### **5.1. Introduction**

This section defines overall management objectives for the principles stated in Section 2.2 and the standards necessary for processing water right applications.

The Policy defines two flow thresholds that provide significant biological functions, namely salmon or steelhead spawning and migration (Salmon Spawning Flow) and inundated riffles (Winter Low Flow).

The management objectives are designed to ensure that: (1) most diversions take place when unregulated streamflows are above levels necessary to sustain natural availability of salmon and steelhead spawning habitat ( $Q_s$ ), (2) diversions at unregulated streamflows greater than  $Q_s$  do not significantly interfere with adult salmon and steelhead migration or geomorphic stream processes, (3) diversions when unregulated streamflows are below  $Q_s$  do not significantly impair natural spawning and juvenile rearing habitat availability or impair adult migration, and (4) winter low flows sufficient to maintain inundated riffles ( $Q_{WLF}$ ) are maintained to sustain stream biological productivity, supply good juvenile anadromous salmonid winter rearing habitat, and successfully incubate eggs through fry emergence. These management objectives have been designed to allow

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<sup>1</sup> The parties may have additional procedural recommendations as the policy moves forward, based on prior work done by the North Coast Water Rights discussion group and the SWRCB Strategic Plan group working to reengineer the water right process.

diversions to be permitted without creating significant cumulative impacts within watersheds sustaining, or potentially sustaining, anadromous salmonid populations.

Either  $Q_s$  or  $Q_{WLF}$  may be calculated using site specific studies or by regional estimates.

## **5.2. Flow Thresholds - Definitions**

### **5.2.1. Salmon Spawning Flow**

The Salmon and Steelhead Spawning and Migration Flow Threshold (“Salmon Spawning Flow” or  $Q_s$ ) is a streamflow threshold important for managing the protection of two steelhead and salmon life history needs in small North Coast California streams: (1) maintaining natural abundance and availability of spawning habitat; and (2) minimizing unnatural adult exposure, stress, vulnerability, and delay during adult spawning migration.

See Appendix [Guidance for Estimating  $Q_{WLF}$  and  $Q_s$ ] for a field methodology and analytical framework to calculate  $Q_s$  and a maximum diversion rate above  $Q_s$ .

### **5.2.2. Winter Low Flow**

The Winter Baseline Flow Threshold ( $Q_{WLF}$ ) is a streamflow threshold important to managing several steelhead and salmon life history needs in small North Coast California streams: (1) maintaining good benthic macroinvertebrate habitat in riffles to foster high stream productivity, (2) preventing redd desiccation and maintaining hyporeic subsurface flows, (3) sustaining high quality and abundant juvenile salmonid winter rearing habitat, and (4) facilitating smolt out-migration.

See Appendix [Guidance for Estimating  $Q_{WLF}$  and  $Q_s$ , at bottom] for a field methodology and analytical framework to calculate  $Q_{WLF}$  and a maximum diversion rate between  $Q_s$  and  $Q_{WLF}$ .

## **5.3. Flow Management Objectives**

The Flow Management Objectives define acceptable changes in stage from cumulative diversions when daily average unimpaired flows ( $Q_D$ ) are at different levels.

- When  $Q_D$  exceeds  $Q_s$ , diversions shall cumulatively cause no more than 0.1 ft change in depth at the median Riffle Crest Thalweg at the Points of Evaluation.
- When  $Q_D$  is between  $Q_{WLF}$  and  $Q_s$ , diversions shall cumulatively cause no more than 0.05 ft change in depth at the median Riffle Crest Thalweg at the Points of Evaluation.
- When  $Q_D$  is less than  $Q_{WLF}$ , diversions are not allowed except as stated in section 5.6 [small projects above the Upper Limit of Spawning Habitat].
- Points of Evaluation for this purpose shall include the Upper Limit of Spawning Habitat and points of interest downstream from there.

The Flow Management Objectives will protect winter life history stages of salmonids, by minimizing cumulative effects, sustaining a productive stream environment, and maintaining channel forming flows. Other elements of the policy help protect other life history stages and other natural resource values. These elements include the season of diversion, the framework for permitting onstream dams, and the requirement that all projects located on Class 1 or 2 streams shall bypass at least  $Q_{WLF}$ .

Diversions consistent with or functionally equivalent to the Flow Management Objectives can be permitted in the absence of unusual circumstances, provided the diversions also comply with policy provisions governing the season of diversion and onstream dams.

Diversions that do not satisfy the Flow Management Objectives require site-specific analyses to be permitted.

The Management Objectives exist to aid decision-making on individual permits, and permit terms established under this Policy should lead to project operations that approximate stream conditions described in the Objectives. The Policy recognizes that water diversions as permitted may not precisely mirror the Management Objectives in every circumstance, or at every moment of every year; and that there is uncertainty associated with measuring or estimating adherence to the Objectives.

### **5.3.1. Calculation of Maximum Cumulative Rates of Diversion**

Applicants may comply with the cumulative rate of diversion management objectives using either a fixed rate of diversion (e.g., X cfs) or a variable rate of diversion based on a specified percentage of the daily streamflows (e.g., Y% of  $Q_D$ ).

The Flow Management Objective that limits diversions to those that cause no more than 0.05 ft change in stage when  $Q_D$  is between  $Q_{WLF}$  and  $Q_S$  shall be calculated so that diversions comply with this objective at any flows between  $Q_{WLF}$  and  $Q_S$ . This means that diversions setting a fixed rate of diversion (X cfs) will be calculated at flows just above  $Q_{WLF}$ , and diversions setting a variable rate of diversion (Y% of  $Q_D$ ) will be calculated at flows just below  $Q_S$ .

The Flow Management Objective that limits diversions to those that cause no more than 0.1 ft change in median RCT stage when  $Q_D$  exceeds  $Q_S$  shall be calculated at flows just above  $Q_S$ . The policy recognizes that setting a variable rate of diversion (Y% of  $Q_D$ ) based on changes in stage at flows immediately higher than  $Q_S$  will result in diversions that change stage by greater than 0.1 ft at the median RCT at higher flows.

A daily diversion rate based on the daily unimpaired streamflow (i.e., a variable rate) can be estimated from a site-specific Q – RCT<sub>m</sub> rating curve. (See Appendix [Guidance for Estimating  $Q_{WLF}$  and  $Q_S$ , at bottom].) Although technologically more challenging to construct, maintain, and finance, a variable maximum diversion rate will be able to withdraw more water annually. The variable rate is also useful for estimating the consequences of fill-and-spill reservoirs above the Upper Limit of Spawning Habitat because each reservoir imposes a variable rate on streamflows downstream at the Upper Limit of Spawning Habitat.

### **5.3.2. Preliminary Regional Estimates of Cumulative Rates of Diversion**

In the absence of site specific studies estimating the relationship between diversions and changes in depth, applicants may use the following estimates:

- When  $Q_D > Q_S$ , diversions shall not exceed [15-20]<sup>2</sup> % of  $Q_D$  (approximately 0.1 ft change in median RCT depth).
- When  $Q_D$  is between  $Q_{WLF}$  and  $Q_S$ , diversions shall not exceed [10-15]<sup>3</sup> % of  $Q_D$  (approximately 0.05 ft change in median RCT depth).

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<sup>2</sup> The parties are conducting additional analyses to refine this relationship, but expect the number to fall within the range of 15-20%. For present purposes, the text that follows uses 20%.

#### **5.4. Season of Diversion**

The season of diversion is December 15 to March 31, unless a site-specific study demonstrates that a different season is appropriate.

#### **5.5. Onstream Dams**

Section \_\_ of this policy contains onstream dam requirements that avoid upstream or downstream additive impacts such as (1) interrupting fish migratory patterns, (2) interrupting downstream movement of gravel, woody debris, or aquatic benthic macroinvertebrates, (3) causing loss of riparian habitat or wetlands, or (4) creating habitat for non-native species.

#### **5.6. Implementation of Flow Management Objectives Above the Upper Limit of Spawning Habitat**

Projects above the Upper Limit of Spawning Habitat may satisfy the Flow Management Objectives with one of three different bypass flows, depending on the project's cumulative flow effects: (1) a bypass term requiring a flow sufficient for spawning salmonids ( $Q_s$ ), (2) a bypass term requiring a flow sufficient to maintain winter baseline flows ( $Q_{WLF}$ ), or (3) no bypass term.

Projects above Upper Limit of Spawning Habitat may estimate functional equivalence with the Flow Management Objectives using the Cumulative Effects Test defined in section [5.6.4].

##### **5.6.1. Fill and Spill Projects that Require No Minimum Bypass Term**

Projects located on watersheds 0.1 square mile (64 acres) and less that cumulatively satisfy the Flow Management Objectives or provide a functional equivalence as estimated by the Cumulative Effects Test in section [5.6.4] may operate as “fill and spill” reservoirs with no minimum bypass flow.

###### **A. Rationale**

In most cases within the policy geographic area, watersheds of 0.1 square mile (64 acres) or less do not produce streamflow of sufficient duration or depth to support aquatic life. The 5% of watershed volume limitation on fill and spill projects with no minimum bypass, combined with the 0.1 square mile (64) acre limit, will protect insect production and other ecological values.

###### **B. Exceptions**

Projects located on watersheds 0.1 square mile (64 acres) and less may be required to bypass  $Q_{WLF}$  if there is evidence that a  $Q_{WLF}$  bypass is required to sustain aquatic life immediately downstream of the diversion.

##### **5.6.2. Projects Required To Bypass $Q_{WLF}$**

All other projects above the Upper Limit of Spawning Habitat that cumulatively satisfy the Flow Management Objectives or provide a functional equivalence as measured by the Cumulative Effects Test in section [5.6.4] shall bypass  $Q_{WLF}$ .

##### **5.6.3. Projects Required To Bypass $Q_s$**

All projects above the Upper Limit of Spawning Habitat that do not cumulatively satisfy the Flow Management Objectives and do not provide a functional equivalence as measured by the

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<sup>3</sup> The parties are conducting additional analyses to refine this relationship, but expect the number to fall within the range of 10-15%. For present purposes, the text that follows uses 10%.

Cumulative Effects Test in section [5.6.4] shall bypass an amount sufficient to provide a proportionate share of  $Q_s$  at the Upper Limit of Spawning Habitat.

#### **5.6.4. Cumulative Effects Test For Projects Above the Upper Limit of Spawning Habitat**

Applicants with onstream reservoirs above the Upper Limit of Spawning Habitat may estimate functional equivalence with the Flow Management Objectives using this volume-based cumulative effects test:

- Cumulative depletion of not more than 5% of the seasonal (November 1 to March 31) volume measured downstream where the watershed measures 1 square mile and points of interest below; or
- Cumulative depletion of not more than 10% of the seasonal volume measured at 1 square mile and points of interest below, if reservoirs operating with no bypass collectively deplete no more than 5% average annual volume; or
- A site-specific study demonstrating that the project's cumulative impacts are consistent with the management objectives.

##### **A. Adjustment of 1 Square Mile Point of Evaluation**

If there is evidence that the Upper Limit of Spawning Habitat is significantly higher or significantly lower in the watershed than the 1 square mile point of evaluation, and that the location of the Upper Limit of Spawning Habitat would affect the outcome of the cumulative effects test in section 5.6.4, the applicant shall prepare a site-specific assessment of the Upper Limit of Spawning Habitat. If the Upper Limit of Spawning Habitat is significantly higher or significantly lower in the watershed than 1.0 square mile, the 1 square mile point of evaluation shall be adjusted accordingly.

#### **5.6.5. Channel Maintenance Flows**

The Flow Management Objective limiting cumulative diversions so that they do not cause more than 0.1 ft change in depth when  $Q_D$  exceeds  $Q_s$  will protect channel forming flows.

Projects above Upper Limit of Spawning Habitat that score well enough on the cumulative effects test in section [5.6.4] so that they do not require a  $Q_s$  bypass do not require a separate Maximum Cumulative Diversion (MCD) limitation to protect channel forming flows. Their scores on the cumulative effects test indicate that they satisfy (or provide functional equivalence to) the Flow Management Objectives without such a limitation.

Projects above the Upper Limit of Spawning Habitat require a separate Maximum Cumulative Diversion (MCD) limitation only when needed to avoid cumulatively exceeding the objective to divert no more than that which causes a 0.1 ft change in depth when flows exceed  $Q_s$ , as calculated at 1 square mile and points of interest below.

##### **A. Adjustment to 1 Square Mile Point of Evaluation**

Applicants may substitute a site-specific determination of Upper Limit of Spawning Habitat for the 1 square mile point of evaluation only if site-specific information demonstrates that doing so will not impact channel forming flows in Class 1 streams above Upper Limit of Spawning Habitat.

For example, large watersheds where the Upper Limit of Spawning Habitat is farther downstream than would be expected (because of a waterfall, or a large municipal dam) may have habitat for resident fish or other resources covered by the policy above the Upper Limit of Spawning Habitat, which require channel forming flows.

### **B. Examples**

Projects that satisfy the CET might temporarily divert more than 20% of  $Q_D$  when flows exceed  $Q_S$ . However, the volume limitation in the CET makes it very unlikely that the diversions would be capturing water at that rate during the high flow events important to channel formation, because at least some of the reservoirs would be full and spilling during a 1.5 year storm event.

Projects that score poorly enough on the CET that they must operate with a bypass flow term set to  $Q_S$  do not need an MCD limitation if they comply with the Flow Management Objectives with that condition imposed. For example, projects that cumulatively impound 15% of the drainage area above 1 square mile might require a  $Q_S$  bypass, but would satisfy the objective limiting diversions to approximately 20% of  $Q_D$  at flows exceeding  $Q_S$  objective without a separate MCD limitation.

Projects that do not pass CET and cannot satisfy the Flow Management Objectives simply by adding a  $Q_S$  bypass may satisfy the objectives by imposing a separate MCD limitation or by other means (e.g., by diverting water only after reservoirs operated by senior rights holders are full or by entering into an agreement with others to rotate diversions).

### **5.7. Mode of Bypass**

#### **A. Active Management**

Onstream reservoirs where the drainage area at the POD is no greater than 1.0 square miles, or 640 acres, may operate with active management of bypass flows, provided that the applicant shall monitor and report rates of flow immediately below the POD as well as diversions and reservoir levels, according to the terms specified in policy section \_\_\_\_ [monitoring].

#### **B. Passive Management**

Diversions where the drainage area at the POD exceeds 1.0 square miles should operate with passive management of bypass flows.

### **5.8. Implementation of Flow Management Objectives Below the Upper Limit of Spawning Habitat**

#### **5.8.1. Bypass Flows**

Diversions located downstream of the Upper Limit of Spawning Habitat may comply with the Management Objectives in one of two ways.

The first method is the simplest: include a permit term requiring a bypass flow of  $Q_S$ .

A second method is possible where the project can limit cumulative diversions when flows are between  $Q_{WLF}$  and  $Q_S$  to rates that would not change stage by more than 0.05 ft. For these projects, it is also possible to comply with the Management Objectives by establishing a bypass flow of  $Q_{WLF}$  and a correspondingly lower cumulative rate of diversion. Because approvals of permits under the method described in this paragraph will make it very difficult for any upstream existing

but un-permitted fill and spill reservoir to be processed using the small projects cumulative effects test in 5.6.4 (and their continued operation would create cumulative effects greater than those estimated for the new permit), the State Water Board will consider the upstream projects in the cumulative rate of diversion, to ensure that the projects cumulatively satisfy the Flow Management Objectives. The method described in this paragraph is most viable where there are no upstream diversions.

### **5.8.2. Maximum Cumulative Diversion**

Diversions located below the Upper Limit of Spawning Habitat shall include a Maximum Cumulative Diversion (MCD) rate limitation consistent with the Management Objective limiting diversions to those that cumulatively cause no more than a change in depth of 0.1 ft at the median RCT when flows ( $Q_D$ ) exceed  $Q_S$ , or to 0.05 ft at the median RCT when flows are between  $Q_{WLF}$  and  $Q_S$ , depending on the method selected for estimating the bypass.

In the absence of site-specific studies, diversions may be limited at a rate of 10% of  $Q_D$  (if diverting when flows are between  $Q_{WLF}$  and  $Q_S$ ) or 20% of  $Q_D$  (if diverting when flows are above  $Q_S$ ).

### **5.8.3. Examples**

A project could operate with a cumulative fixed rate of diversion at 20% percent of  $Q_S$  (or a different percent based on site-specific studies) and an intake set so that no diversions take place when flows are at  $Q_S$  or below.

A project could set a higher fixed rate and a higher bypass flow.

A project could operate with variable-speed pump, or with multiple pumps (i.e., a second pump that operates only at higher flows) so that cumulative diversions total no more than 20% of  $Q_D$  at any of the flows above of  $Q_S$ , and an intake at  $Q_S$ .

## **5.9. Guidance for Estimating $Q_S$ or $Q_{WLF}$**

The Salmon Spawning Flow ( $Q_S$ ) or Winter Baseline Flow ( $Q_{WLF}$ ) may be calculated using provisional regional estimates specified below or site specific studies.

In larger watersheds (i.e., those greater than about 10 square miles),  $Q_{WLF}$  will result in deeper flows than  $Q_S$ . Where that is true, applicants should substitute the calculation of  $Q_{WLF}$  for  $Q_S$  where the policy would otherwise call for a calculation of  $Q_S$ . The Guidance for Calculating  $Q_S$  and  $Q_{WLF}$  [see Appendix] is designed for watersheds smaller than 10 square miles; the Policy adopts an interim standard of the February Median for  $Q_{WLF}$  in watersheds greater than 10 square miles.

### **5.9.1. Site Specific Studies**

Protocols for calculating  $Q_S$  and  $Q_{WLF}$  using a site specific study are included as Technical Appendix \_\_ to the policy (see [Guidance for Estimating  $Q_{WLF}$  and  $Q_S$ , below]). The State Water Board may approve other methodologies for calculating  $Q_S$  or  $Q_{WLF}$  on a case-by-case basis.

### **5.9.2. Regional Estimates for Calculating Flow Thresholds**

The Policy includes interim formulae for calculating  $Q_S$  or  $Q_{WLF}$  based on regional estimates using drainage area and average annual runoff. The formulae shall be tested and adjusted based on the results of additional field work and site specific studies.

#### **A.      Regional Estimate of Q<sub>s</sub>**

*To be re-calculated by agency staff.*

#### **B.      Regional Estimate of Q<sub>WLF</sub>**

Applicants may use the February Median flow as an estimate of Q<sub>WLF</sub>.

#### **5.10.    Guidance for Estimating Upper Limit of Spawning Habitat**

The Upper Limit of Spawning Habitat for a given stream is the stream reach that includes the uppermost habitat that may support anadromous fish spawning under unimpaired conditions (in normal and above-normal water year types). A protocol for calculating Upper Limit of Spawning Habitat with a site specific study is adopted as a technical appendix to the policy (see \_\_\_\_). For some purposes, such as a site-specific calculation of Q<sub>s</sub>, multiple Upper Limits of Spawning Habitats for multiple species may need to be determined in order to assure flows protective of steelhead at one depth and Chinook at a greater depth farther downstream.

*[The following sections are out of order, but for now they're together at the end.]*

### **6.      Watershed-Based Approaches**

**State Water Board Staff Response:** Staff considered these comments in the development of revisions to Section 12.0 (Watershed Approach) of the Draft Policy.

The State Water Board recognizes the efficiency of evaluating applications for individual project applications on a watershed scale. It also recognizes the benefit of cooperation of new and existing projects in real-time operations of their facilities, mitigation and monitoring measures, and other activities. This policy considers two alternative forms of these watershed-based approaches: coordinated permitting, and coordinated management.

#### **6.1.    Coordinated Permitting**

The State Water Board encourages applicants, on their own initiative, to coordinate in the development of technical information and hearings on project applications and petitions to better understand and mitigate cumulative effects.

##### **6.1.1.   Technical Information**

Applicants in a given watershed are encouraged to coordinate the development and submittal of water availability analyses, environmental impact assessments, and other technical information needed for State Water Board's determination of the impacts of the proposed projects on senior right holders, the environment, the public trust, and the public interest.

##### **6.1.2.   Application Review and Hearing**

Applicants in a watershed are encouraged to propose coordinated review and hearings on their applications and petitions to promote efficient resolution of common issues of law and fact.

#### **6.2.    Charter Approach for Coordinated Management**

A Watershed Group Charter approach is a mechanism recognized by the Division of Water Rights to a group of water users within a watershed to perform certain otherwise lawful activities, such as water diversions and compliance monitoring, in a coordinated manner, in compliance with the Water Code and other laws.

### **6.2.1. Definition of Charter**

A Charter is an agreement between the Division of Water Rights and a group of water users within a watershed (Watershed Management Group or Charter Group, defined in Section 6.2.2) that sets forth the process and respective responsibilities by each party for obtaining new water rights or modifying existing water rights or for other State Water Board approvals necessary to implement a Diversion Management Plan (Section 6.2.3) and enforceable Water Diversion and Streamflow Implementation Plan (Section 6.2.4). At a minimum, the Charter shall define the basic goals or objectives of the Charter Group, the requested Water Board approvals, and water right application or petition processing steps (defined generally in Sections 4.1.1 and 4.1.2). The plans developed pursuant to this section shall generally be guided by the scientific approach set forth in Sections 5 and 7 of the Policy, but the Charter may also identify streamflow enhancements not addressed by Section 5 of this Policy (which focuses on permitting standards for rainy season diversions); for example, the plan might focus on improving flows to sustain summer rearing habitat, or flows to sustain non-salmonid biological resources.

### **6.2.2. Definition of a Watershed Management Group or Charter Group**

A Watershed Management Group, or Charter Group, is a group of applicants, petitioners, and/or existing water right holders who enter into a formal Charter pursuant to this policy to develop and implement a Diversion Management Plan and enforceable Water Diversion and Streamflow Implementation Plan to manage water resources to maximize beneficial uses, including protection of the environment and public trust resources. Such a group may include diverters under any claim of right recognized under the Water Code and other applicable law, including riparian, pre-1914 appropriative, and permitted appropriative rights. The Charter Group is encouraged to include non-profit corporations, government agencies, or other people who will participate in Group activities (for example monitoring, coordination, or management plan development) but will not hold water rights.

### **6.2.3. Elements of Diversion Management Plan**

Applicants, petitioners, and existing diverters that choose to form a Charter Group shall submit a proposed charter and Diversion Management Plan to the State Water Board.

The purpose of the Diversion Management Plan is to establish the specific goals, procedures, and other requirements for the Charter Group to maximize beneficial uses of water resources. The Diversion Management Plan is a resource planning document. The Water Diversion and Streamflow Implementation Plan (Section 6.2.4) is the implementing document.

The proposed charter and Diversion Management Plan shall contain the following information:

- (i) Names and contact information for all participants;
- (ii) Description of water rights, applications, or petitions held by the participants;
- (iii) An estimation of what percentage of total diversions in the watershed are so included, and other information to demonstrate that membership is sufficient to achieve the goals and responsibilities of the group;

- (iv) Measurable objectives for enhancing water supply reliability and instream flows under the proposed charter;
- (v) Plan for coordination of reviews of pending project applications and new applications or petitions to be filed to implement the group's objectives;
- (vi) Procedures for meaningful consultation with non-member stakeholders;
- (vii) A proposed enforceable Water Diversion and Streamflow Implementation Plan as described below;
- (viii) Demonstration of financial and other capacities to perform the Implementation Plan;
- (ix) Schedule and assignment of specific responsibilities for performance;
- (x) Procedures for effective governance, including dispute resolution, among participants;
- (xi) Description of enforceable responsibilities for water right holders in the event the Charter Group fails to comply with the Implementation Plan; and
- (xii) Provisions for monitoring and reporting to the State Water Board.

#### **6.2.4. Elements of Water Diversion and Streamflow Implementation Plan**

The Charter Group shall submit for Division approval an enforceable Water Diversion and Streamflow Implementation Plan detailing the means by which the Charter Group will coordinate, at a minimum:

- (i) Operation and maintenance of diversions;
- (ii) Compliance with stream flow performance measures based on actual habitat conditions;
- (iii) Implementation of mitigation measures; and
- (iv) Monitoring and reporting sufficient to demonstrate compliance with diversion requirements, stream flow performance measures, and other components of the Management Plan.

#### **6.2.5. Review and Approval of Group Charter and Implementation Plan**

The State Water Board shall provide public notice of the proposed Diversion Management Plan and Water Diversion and Streamflow Implementation Plan, and consider public comments.

The State Water Board shall approve the proposed Water Diversion and Streamflow Implementation Plan if it determines that implementation of the plan is expected to provide greater benefit to beneficial uses of water resources including the environment and public trust values than would exist under individual regulation of water rights. It may attach reasonable conditions to the Water Diversion and Streamflow Implementation Plan related to the operations of the Charter Group. The State Water Board shall condition the Charter Group participants' water rights on compliance with the Water Diversion and Streamflow Implementation Plan.

#### **6.2.6. Technical Documents for Project Applications or Petitions within a Charter Group**

Water right applications and petitions submitted by participants in a Charter Group are subject to the ordinary requirements of the Water Code and implementing regulations, except that the Charter Group participants will coordinate processing, including the development of technical documents, as specified in the Charter.

#### **6.2.7. Exercise of Water Rights under Group Charter**

##### **i. Individual Right**

The approval of a Water Diversion and Streamflow Implementation Plan does not alter the nature of a water right, including the obligation of the individual permittee, licensee, or other diverter, as appropriate, to comply with applicable law.

##### **ii. Consistency with Applicable Law and Rule**

Each Implementation Plan shall be consistent with the general requirements of this policy and all applicable federal, state, and local laws. It shall not propose actions that result in any diminishment of the State Water Board's authority to require or enforce conditions to protect fish and wildlife, other public trust resources, or senior water right holders.

##### **iii. Special Terms and Conditions**

In addition to standard terms and conditions, each right operating under an approved Water Diversion and Streamflow Implementation Plan shall be issued or amended, as appropriate, to contain a special term requiring participation in the group, and the performance of actions specified in the Implementation Plan.

#### **6.2.8. Terms and Conditions That Become Effective If Charter is Dissolved**

Each individual water right operating under an approved Water Diversion and Streamflow Implementation Plan shall specify the terms and conditions that will be in effect for the protection of natural resources and other beneficial uses in the event the Charter Group dissolves, State Water Board approval is revoked, or the Implementation Plan becomes inoperative.

#### **6.2.9. Revocation or Modification of Charter and Implementation Plan**

The State Water Board will retract its approval of a charter, Water Diversion and Streamflow Implementation Plan or direct Charter Group participants to comply with a time schedule for coming into compliance if the group does not timely perform its obligations as specified in the Charter and Water Diversion and Streamflow Implementation Plan. Participants and other stakeholders may petition the State Water Board for such an action or the Board may act on its own initiative.

### **7. Stewardship Incentives to Improve Stream Flows**

**State Water Board Staff Response:** Staff considered the following comments in the development of policy provisions allowing voluntary modification of authorized diversions for the enhancement of fish and wildlife resources.

#### **7.1. Introduction**

It is the policy of the board to promote proactive stewardship activities by existing water users to improve stream flows for the conservation of salmon, steelhead, and other natural resources. This

section creates incentives for voluntary stewardship, and in particular, projects designed to enhance summer rearing habitat for anadromous fish. It does so by expediting permits for new projects to improve summer stream flows, and by providing guidance for applicants for new water rights who can improve diversion practices elsewhere as a means to justify their permit.

## **7.2. Priority Processing for Stream Flow Enhancement Projects**

### **7.2.1. Definition**

“Stream Flow Enhancement Project” means a project that enhances stream flows (1) by reducing existing legal diversions during the dry season (2) where there is juvenile rearing habitat that would benefit from the foregone water diversion and (3) the applicant can ensure that the foregone water remains instream (for example through a petition for change under Water Code section 1707 or a functional equivalent). Stream Flow Enhancement Projects include appropriative water rights for any purpose of use, including municipal, and for Small Domestic Use registrations. (See also Section XX [SDU] with specific language to encourage water storage tanks under an SDU registration.)

### **7.2.2. Priority Processing: Preliminary Finding of Net Benefit**

The State Water Board will grant priority processing to Stream Flow Enhancement Projects if the Deputy Director for Water Rights finds that the project as a whole is likely to provide a net benefit to instream flows and to serve the public interest. In making this preliminary finding of likely benefit, the Deputy Director may rely on written statements of support for the project by Department of Fish and Game, National Marine Fisheries Service, or other state or federal agencies that have participated in or funded the project.

### **7.2.3. Standard for Approval**

For Stream Flow Enhancement Projects, Applicant shall propose terms and conditions consistent with the general principles stated in Section 2.2 of the policy.

The State Water Board will approve a Stream Flow Enhancement Project if the Deputy Director for Water Rights finds that project as a whole provides a net benefit to instream flows and serves the public interest, after consultation with the Executive Officer of the Regional Water Quality Control Board and Chief of the Water Branch, Department of Fish and Game.

In making the net benefit and public interest finding the Deputy Director for Water Rights is also encouraged to consult with the National Marine Fisheries Service and other resource agencies that may have participated in the development of the project. In making the finding, the Deputy Director may rely on written statements of support of or opposition to the project by those agencies and on other evidence in the record.

### **7.2.4. Presumption of Net Benefit**

Where the Stream Flow Enhancement Project would not increase the total volume of water to be used annually beyond the Applicant’s existing rights, but requires a water right permit for new or expanded offstream storage in order to shift the timing and manner of diversion, then there is a presumption that project provides a net benefit to instream flows and serves the public interest. The fisheries review by the Division of Water Rights shall be intended to confirm that unusual circumstances do not exist to overcome the presumption of net benefit (e.g., the proposed diversion is not blocking fish habitat).

### **7.3. Stewardship Incentives for Water Right Applicants**

This section establishes a mechanism for water right applicants conducting site specific studies to get credit for stewardship activities that go beyond the scope of the project, such as mitigation measures imposed on other senior water rights the applicant owns.

#### **7.3.1. Encouraged Activities**

The following stream flow-related actions, when added as mitigation to a project subject to this policy may justify approving projects that do not strictly satisfy the Management Objectives:

- (i) addition of a season of diversion to an existing senior water right;
- (ii) addition of a bypass flow requirement to an existing senior water right;
- (iii) addition of a maximum rate of diversion limitation to an existing senior water right;
- (iv) removal of an artificial barrier to the migration of anadromous fish;
- (v) removal of an onstream reservoir;
- (vi) relocation of a point of diversion to reduce impacts to aquatic resources;
- (vii) changes to frost protection practices undertaken pursuant to an existing water right that improve habitat for aquatic resources (which could include moving a point of diversion, adding or expanding storage, improving efficiency, or implementing alternative frost protection techniques); and
- (viii) similar activities that have the effect of creating habitat with improved flows.

#### **7.3.2. Standard for Approval**

Permits justified by reliance on these activities will be granted if the Deputy Director for Water Rights finds after consultation with the Executive Officer of the Regional Water Quality Control Board and Chief of the Water Branch, Department of Fish and Game that the project, including these actions, provides a net benefit to instream flows and serves the public interest.

In making the net benefit finding, the Deputy Director is also encouraged to consult with the National Marine Fisheries Service and other resource agencies that may have participated in the development of the project. In making the finding, the Deputy Director may rely on written statements of support of or opposition to the project by those agencies and on other evidence in the record.

### **7.4. Stewardship Incentives for Small Domestic Registrations**

*[This probably goes with the Policy sections on Small Domestic Registrations, but for now we put it here.]*

The State Water Board shall extend the season of diversion of a Small Domestic Registration beyond March 31 if the Department of Fish and Game concurs that (1) the purpose of the appropriation is to allow the registrant the flexibility to divert water for beneficial use in a manner that improves conditions for fish and wildlife, and (2) the registration would allow the registrant to forgo or reduce diversions under other valid basis of right during periods of the year that are most critical to fish and wildlife. This exception does not limit or expand DFG's authority to condition the registration pursuant to Water Code section 1228, et seq.

## **8. Compliance Monitoring, and Reporting**

This section details the monitoring and reporting necessary for showing compliance with permit and license terms pertaining to diversion of water.

Permits shall require continuous monitoring of diversions for each point of diversion and other conditions necessary to demonstrate compliance with permit terms relating to bypass flows, seasons of diversion, and rate of diversion. For purposes of this Section, “continuous” means at time intervals of 1 hour or less.

Diversion data shall be reported with next Progress Report By Permittee or Report of Licensee, or whenever requested by the State Water Board. Permits shall include a term stating that the State Water Board intends to develop and implement a basin-wide program for real-time electronic monitoring and reporting in a standardized format, and that such reporting will be required upon a showing by the State Water Board that the infrastructure is in place to accept real-time electronic reports. It shall not be necessary to amend the permit at that time.

### **8.1. Monitoring and Reporting for Direct Diversions and Diversions to Offstream Storage**

#### **8.1.1. General**

Permits for direct diversions and diversions to offstream storage shall require monitoring, recording, and reporting the timing and quantity of water actually diverted from the stream (e.g., with an electronic inline flow meter).

#### **8.1.2. Compliance with Bypass Terms**

Permits for direct diversions and diversions to offstream storage shall require proof of compliance with a bypass flow requirement (if any) in one of two ways:

##### **A. Passive Management Systems**

A passive bypass system is one in which a gravity flow intake or pump intake is set above a designated depth in the stream. Permits for passive bypass systems shall demonstrate compliance by annually preparing a signed statement, with photographic evidence, certifying that the passive bypass system operates as set forth in the specific compliance plan approved by State Water Board (see Section \_\_\_\_).

**State Water Board Staff Response:** This is one way to passively bypass water. There may be others.

##### **B. Active and Automated Management Systems**

An active bypass system is one in which a valve or pump is operated manually to make diversions from the stream.

**State Water Board Staff Response:** The Draft Policy does not allow for an active bypass system.

An “automated” system for these purposes includes a pumped diversion facility having an intake below the depth of flow corresponding to the bypass flow, where automated on-off controls are

used with the “on” control set to actuate the pump only if the depth of streamflow is greater than that corresponding to the bypass flow, and the “off” control set to turn the pump off if the depth of flow is less than that corresponding to the bypass flow.

**State Water Board Staff Response:** Depending on how the automated on-off controls are designed, the system described may be a passive bypass system. Use of mechanical float switches that do not involve human interaction that are designed to operate so that the minimum bypass flow is maintained may be a passive bypass system.

Permits for active and automated bypass systems shall demonstrate compliance with the minimum bypass flow requirements by continuously monitoring streamflow or stream stage readings, stream temperature, and diversions using automated measuring devices at the Point of Diversion, or at an alternative location approved by the State Water Board. The flow data shall be recorded on an hourly (or more frequent) basis, in a format that can be readily downloaded into a computer spreadsheet program or database for subsequent reporting.

#### **8.1.3. Compliance with Season of Diversion**

Facilities used to directly divert water from streams or divert from streams to offstream storage shall not be operated outside of the allowed diversion season. Examples of methods to comply include the following:

- Valves on gravity flow diversion pipelines shall remain closed.
- Power supplies to pumps shall be disconnected.

Compliance shall be documented by dated photographs, reservoir staff gage readings, diversion pipeline flow meter readings, diversion pump power meter readings, or diversion pump hour meter readings (as applicable), with said documentation to be submitted with the next Progress Report By Permittee or Report of Licensee, or whenever requested by the State Water Board.

**State Water Board Staff Response:** The Policy does not suggest methods of compliance. Diverters may have other rights that allow diversion during other diversion season.

### **8.2. Monitoring and Reporting for Onstream Reservoirs**

#### **8.2.1. General**

Permits for onstream reservoirs shall require monitoring of reservoir levels, releases from the reservoir to the stream channel, and withdrawals from the reservoir (e.g., using a pressure transducer for the reservoir, and an inline flow meter for the releases and withdrawals from the reservoir, as applicable).

#### **8.2.2. Compliance with Bypass Terms**

**State Water Board Staff Response:** The policy does not specify the method of compliance. Although the commenters provide one example of each system, there may be other methods to achieve compliance with bypass terms.

Permits for onstream reservoirs shall require proof of compliance with a bypass flow requirement (if any) in one of two ways:

#### **A. Passive Management Systems**

A passive bypass system is one in which a diversion facility is installed in the stream channel upstream of the reservoir that is designed, without manual or automatic operation of any components, to intercept all streamflow up to the required bypass flow, convey the intercepted flow around the reservoir in a pipe or channel, and then discharge the flow to the stream downstream of the reservoir. The diverter shall submit with each Progress Report by Permittee or Report of Licensee a signed statement, with photographic evidence, certifying that the passive bypass system is operational as set forth in the compliance plan approved by State Water Board.

#### **B. Active and Automated Management Systems**

An active bypass system is a passive bypass facility that requires manual or automated operation. An “automated” system includes an automated catch-and-release system that computes inflow to the reservoir and releases the required bypass flow through an outlet conduit or pumped release facility. Permits for active and automated bypass systems shall demonstrate compliance with the minimum bypass flow requirements by continuously monitoring reservoir stage, releases from the reservoir to the stream channel, stream temperature (measured in flow released from reservoir) and withdrawals from the reservoir (e.g., using a pressure transducer for the reservoir, and an inline flow meter for the releases and withdrawals from the reservoir). The data shall be recorded on an hourly (or more frequent) basis in a format that can be readily downloaded into a computer spreadsheet program or database for subsequent reporting.

#### **8.2.3. Compliance with Season of Diversion**

The level of the reservoir at the end of the irrigation season (generally in October or November) and prior to any natural inflow shall be recorded. Streamflow entering the reservoir prior to the start of the allowed diversion season shall be released in a manner that meets with the approval of the State Water Board and the Department of Fish & Game such that the reservoir is not capturing water in violation of the permit. Compliance shall be demonstrated by monitoring of reservoir levels and withdrawals from the reservoir (e.g., using a pressure transducer for the reservoir and an inline flow meter for withdrawals from the reservoir).

#### **8.3. Monitoring and Reporting of Streamflow**

Permits require monitoring and recording of streamflow and temperature, which shall be achieved by either of the following methods:

##### **8.3.1. Individual Stream Flow Monitoring and Reporting**

Permittees may install an automated flow and temperature measuring device or devices downstream of the point of diversion.

The location of such devices shall be specified in the compliance plan approved by the State Water Board. The flow data shall be recorded on an hourly (or more frequent) basis in a format that can be readily downloaded into a computer spreadsheet program or database for subsequent reporting. The State Water Board may incorporate the data into a Regional Monitoring Program discussed below.

##### **8.3.2. Participation in Regional Stream Flow Monitoring Program**

Permittees may participate in a Regional Monitoring Program (Program) described in section \_\_\_\_ of the policy (Policy Effectiveness Monitoring and Review). A permittees' participation in the Program will require payment to the entity designated by the State Water Board pursuant to Section 9 and access to the permittee's property for the gauging and data collection required by the monitoring entity necessary to implement the program, in accordance with the terms of a formal agreement between the permittee and the monitoring entity for payment and access.

In instances where the State Water Board determines that streamflow monitoring at the POD is not required for compliance monitoring (e.g., to verify compliance with a bypass flow requirement for a project with active management), and participation in the Program would provide more useful information than information collected at the POD, Permittees will be required to participate in the Program rather than conduct site-specific monitoring and reporting of stream flows.

#### **8.4. Reporting**

**State Water Board Staff Response:** The State Water Board does not require continuous recording of stream flow except for automated computer controlled bypass systems which may monitor on a continuous basis but is required to record on an hourly basis. The State Water Board does not have the budget to implement continuous on-line stream flow reporting. The State Water Board has an on-line database called EWRIMS that contains information on existing authorized diversions and pending water right applications. The State Water Board is in the process of adding functionality to the EWRIMS on-line database to allow on-line viewing of Permittee Progress Reports and Reports of Licensee, which contain monthly diversion and use amounts. Permit terms may also require the monitoring and reporting of the parameters described in this comment. The State Water Board does not have plans to provide live streaming of data over the internet.

Until further modified by formal action of the State Water Board, the data required by this section shall be submitted in either hard-copy or electronic format with annual Progress Reports by Permittee, Reports of Licensee, or whenever requested by the State Water Board. Certifications for passive bypass systems shall be submitted with the Progress Reports by Permittee, Reports of Licensee, or whenever requested by the State Water Board.

Data required for automated bypass systems shall be recorded on an hourly (or more frequent) basis and presented both graphically and numerically for the previous reporting period, and shall be submitted with Progress Reports by Permittee, Reports of Licensee, or whenever requested by the State Water Board.

#### **8.5. Development of Standardized Electronic Reporting**

Within one year of the adoption of this policy, the State Water Board will prepare and distribute standardized electronic forms for the information required by the policy.

Within two years, the State Water Board will provide the means by which the information may be reported electronically. The Board shall require electronic reporting but make allowances for paper reporting for water right holders on a case-by-case basis.

##### **8.5.1. Publication on the Internet**

Within four years, the State Water Board will institute a system to publish on the Internet the data required by this section and collected under section 9 (Regional Monitoring and Policy Effectiveness Review). The State Water Board may partner with other state or federal agencies or organizations for this purpose.

The Regional Monitoring and Policy Effectiveness Review Program (Section 9) shall provide for real time reporting and publication of stream conditions where stream conditions are monitored (either individually or regionally).

### **8.6. Compliance Plans**

The State Water Board shall require applicants and petitioners to submit a compliance plan for the State Water Board's review and approval, prior to the issuance of a permit. The compliance plan shall identify how the diverter will comply with the terms and conditions of permits or orders, and shall include a schedule for the construction of any required facilities and the implementation of any mitigation plans.

**State Water Board Staff Response:** *The State Water Board imposes certain conditions in the permit or Order; therefore, it makes sense to issue the permit or Order but to prohibit diversion or construction until a compliance plan is in place. Staff will consider modifications to the Draft Policy to require schedules for construction of facilities and implementation of mitigation plans where needed.*

The compliance plan shall include specific conditions and procedures by which the State Water Board may enter onto the permittee's property for inspection of compliance with permit terms and conditions.

**State Water Board Staff Response:** *The State Water Board already utilizes standard permit terms require the permittee to allow representatives of the State Water Board reasonable access to the project to determine compliance with the permit.*

Permits shall state that the State Water Board reserves authority to remedy cumulative impacts on public trust resources; this reservation includes the authority to modify permit terms as a result of new information developed after the permit is issued, through compliance or policy effectiveness monitoring, or through other means.

**State Water Board Staff Response:** *The State Water Board already utilizes standard permit terms that address this comment.*

## **9. Regional Monitoring and Policy Effectiveness Review**

**State Water Board Staff Response:** *The Draft Policy allows the State Water Board to implement a policy effectiveness monitoring program. The State Water Board does not have the funding or staffing level to implement it at the present time. This does not prevent the State Water Board from considering monitoring data and analysis that may*

be developed and submitted by federal, state, or local agencies, or interested persons to the State Water Board for consideration prior to periodic reviews of the Policy.

The State Water Board shall develop and implement a Regional Monitoring and Policy Effectiveness Review program.

The purpose of the program will be to develop data through field monitoring and, based on the data, evaluate (1) the effectiveness of whether the standards for maintaining instream flows are protective of anadromous salmonids and their habitat over the medium term, in the range of a 10 to 20 year time horizon, as well as over the long term, and (2) whether the policy may need to be modified in order to support recovery of listed species and otherwise protect beneficial uses. The program will focus on evaluating the effectiveness of the standards for diversion season, minimum bypass flow, maximum cumulative diversion, and onstream dam mitigation measures, as well as other aspects of the policy.

The program will develop data through monitoring of stream hydrology, geomorphology, and anadromous salmonid habitat conditions in selected representative streams throughout the policy area.

Five years from the effective date of the policy, and every five years thereafter, the State Water Board will review the policy and determine whether it should be revised.

The program may coordinate with and utilize and incorporate data from other ongoing monitoring programs carried out by other state, federal, and local agencies, to the fullest extent practicable.

The State Water Board will develop the Regional Monitoring and Policy Effectiveness Review program, including the funding mechanism and the entity managing the data collection, within one year of the adoption of this policy. The entity or entities managing the data collection might include USGS, the University of California, water agencies, resource conservation districts, non-profits, or state agencies such as the Regional Water Boards.

The State Water Board will consider the recommendations contained in Chapter 10 and Appendix K of R2 Resource Consultants (2007a) when implementing this program.

The State Water Board will require water right holders to fund the development and implementation of the program (see mitigation payments specified in section [8.3.2] (participation in Regional Monitoring Program as an alternative to individual monitoring of stream conditions), and shall also seek public funding.

If possible, the program will provide for USGS operation of gauges throughout the policy area. It will, at a minimum, provide for stream gauging at a level contemplated by Appendix K. It is anticipated that water right holders will pay for instruments and the staff time necessary for installation and upkeep, and that right holders will provide access to streams, but that water right holders will not be required to operate the program.

## **10. Enforcement**

## **11. Fish Passage and Screens for Diversions on Class 1 Streams**

**12. Standards for Processing Permits for Onstream Dams and Reservoirs**

**13. Small Domestic Use and Livestock Stockpond Registrations**

## **APPENDIX**

### **AB 2121 Joint Recommendations Guidance for Estimating $Q_{WLF}$ and $Q_s$**

**State Water Board Staff Response:** Please see the technical evaluation provided in “Review of TU/WB/ESH Proposal”, Stetson Engineers and R2 Resource Consultants, November 2009.

#### **Definitions**

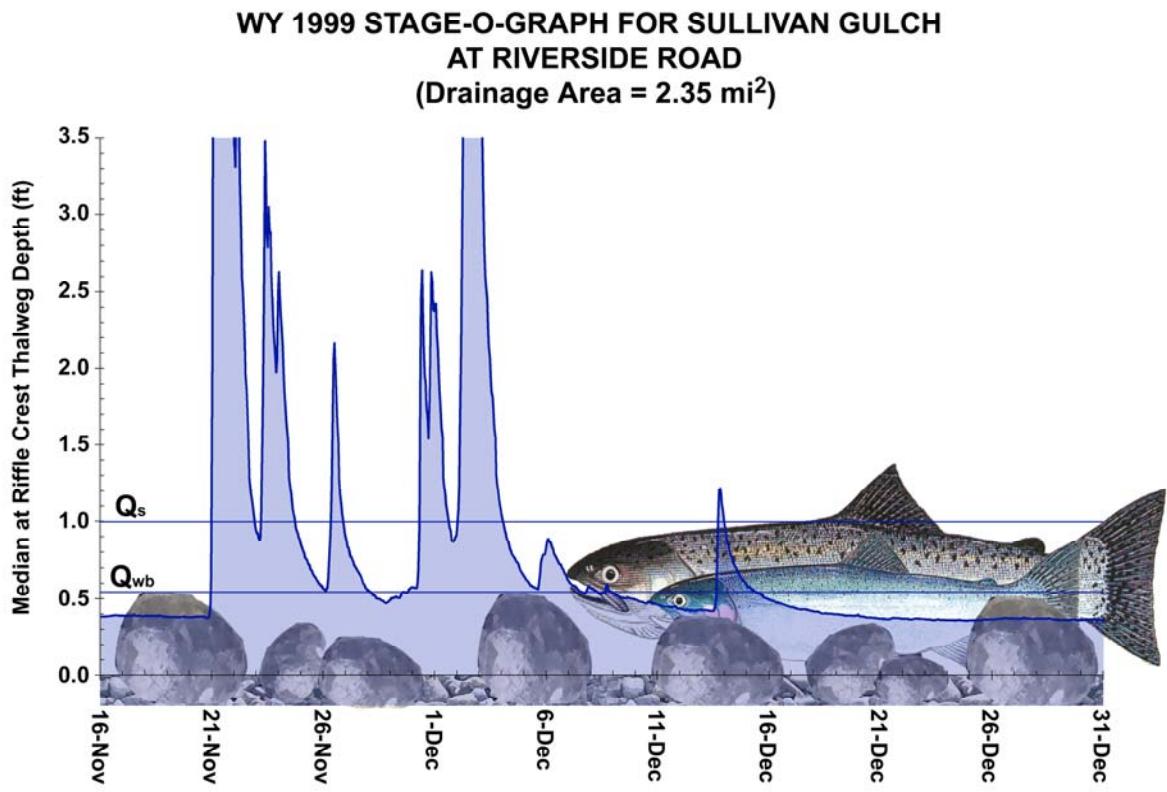
The Salmon and Steelhead Spawning and Migration Flow Threshold (“Salmon Spawning Flow” or  $Q_s$ ) is a streamflow threshold important for managing the protection of two steelhead and salmon life history needs in small North Coast California streams: (1) maintaining natural abundance and availability of spawning habitat; (2) minimizing unnatural adult exposure, stress, vulnerability, and delay during adult spawning migration; and (3) protecting a range of flow below  $Q_s$ .

The Winter Low Flow Threshold ( $Q_{WLF}$ ) is a streamflow threshold important to managing several steelhead and salmon life history needs in small North Coast California streams: (1) maintaining good benthic macroinvertebrate habitat in riffles to foster high stream productivity, (2) preventing redd desiccation and maintaining hyporeic subsurface flows, (3) sustaining high quality and abundant juvenile salmonid winter rearing habitat, and (4) facilitating smolt out-migration.

#### **Guidance for Estimating $Q_{WLF}$ and $Q_s$ in Small Watersheds 10.0 Square Miles and Less: Proposed Field and Analytical Methodologies**

##### **I. Introduction**

The Joint Proposal requires defined flow thresholds and diversion rates.  $Q_s$  is a threshold encountered on receding storm flows, whereas  $Q_{WLF}$  is a post-storm threshold occurring over a wide range of winter flows for wet and dry water years. The “stage-o-graph” of daily riffle depths in Figure 1 demonstrates how the relationship between migrating adult salmon and steelhead (both in the figure scaled to the Y-axis) differs in small streams than large streams (for this purpose, it is better than the more common hydrograph). For only brief periods during the two storms are riffle depths deeper than the adult Chinook salmon and steelhead portrayed. The window-of-opportunity to migrate and spawn is narrow. Both  $Q_s$  and our recommended protocol for diverting streamflows above  $Q_s$  (functioning as a threshold) were designed to maintain the natural duration, frequency, and timing of this narrow access. In contrast,  $Q_{WLF}$  plays a key role in keeping the riffles inundated (note the riffle substrate in Figure 1) to provide productive habitat for benthic macroinvertebrates, incubate redds, and sustain good winter juvenile salmonid rearing habitat.



*Figure 1. Daily riffle depths (measured at the crest of riffles) between November 16 and December 31 with scaled adult Chinook salmon and steelhead that annually spawn in Sullivan Gulch.*

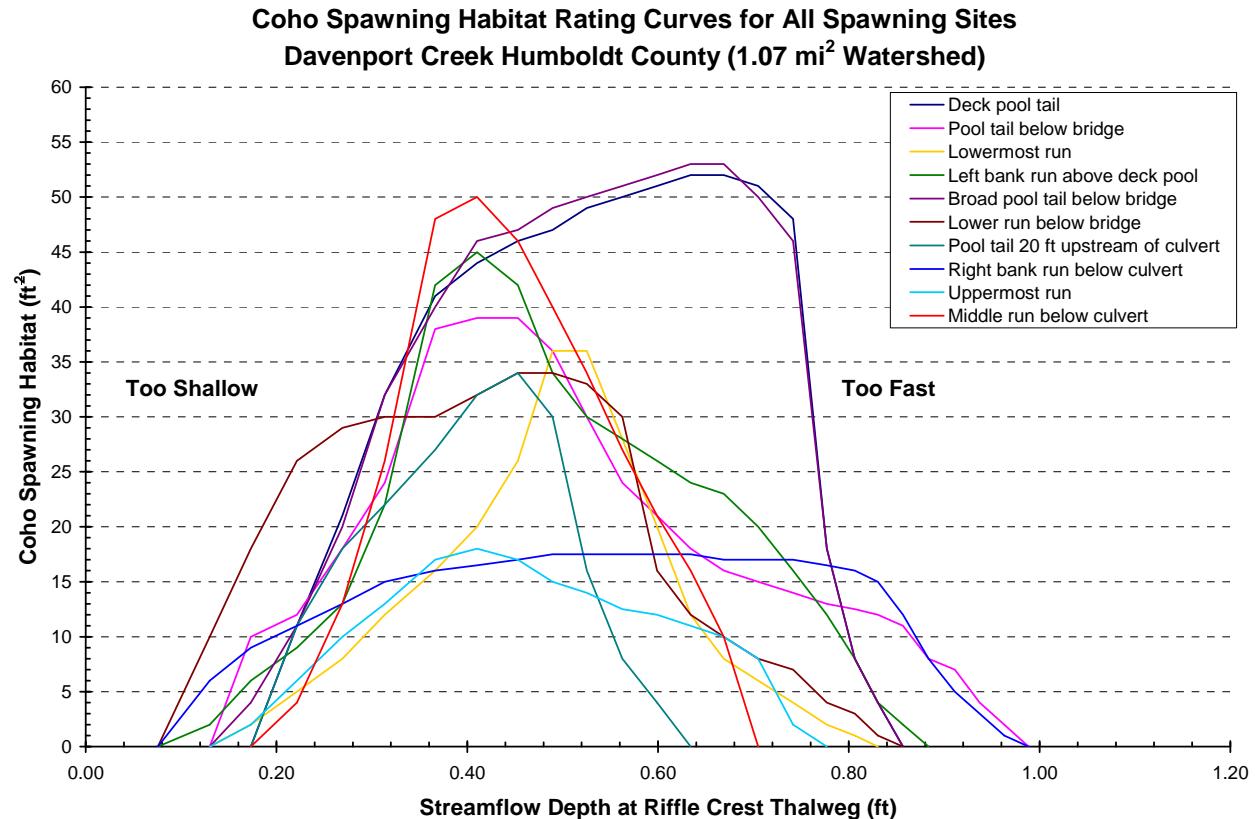
## II. The Riffle Crest Thalweg (RCT) as a Reference

The riffle crest elevation is an important hydraulic control, and therefore an important physical stream feature affecting habitat quantity and availability. If all streamflow was abruptly cut-off, the stream's pools would become isolated "tea cups" of standing water separated by dewatered riffles. The water surface elevation of each "tea cup" would be determined by the immediate downstream riffle crest's thalweg elevation, where the "thalweg" is the deepest spot on a channel cross section spanning the riffle crest. Fish biologists and geomorphologists define maximum pool depth at zero streamflow as the "residual" pool depth. During stream surveys, maximum pool depth can be measured independent of the ambient streamflow (by subtracting streamflow depth at the downstream riffle crest from the maximum pool depth).

The median riffle crest thalweg ( $RCT_m$ ) is used as a physical baseline and reference point for developing the instream flow thresholds and diversion rates in the policy. The riffle crest thalweg is easy to identify and provides a consistent reference point for measuring streamflow depth. The RCT provides the nexus for recommending diversion rates that will protect salmonid life history

needs. The shallowest location for fish passage, tracing the deepest route through a riffle, generally is at the riffle crest's thalweg. It is easy to identify and take a depth measurement at the RCT, and this methodology can be used to provide a consistent streamflow estimate for any given water depth. With this method, each applicant could use a site-specific study protocol, instead of conditions based on regional trends, for bypass streamflows and diversion rates.

Anadromous salmonid habitat availability is highly sensitive to change in RCT depths of 0.2 feet, as illustrated in Figure 2. The methodology described below focuses on establishing rates of diversion that do not reduce depths by more than specified amounts at the QWLF or  $Q_s$  thresholds.



*Figure 2. Spawning habitat rating curves for individual spawning locations on Davenport Creek as a function of riffle crest thalweg depth.*

### RCT Surveys: Establishing the Q – RCT Relationship

The methodology defined here includes a RCT survey. The primary task for the RCT survey is to measure and establish a site-specific quantitative relationship between streamflow and the median RCT depth. This is done so that  $Q_s$  or QWLF can be estimated, and rates of diversion established, for the POD. Identification of the RCT requires minimal training and expertise, but professional guidance at the onset of fieldwork is recommended. Because the RCT depth can vary along the stream channel for a given streamflow, the RCT depth at 15 or more riffle crests should be measured per POD. At each riffle crest, only one measurement at the thalweg need be taken, with a stadia rod or ruler.

A map showing a typical study site is included as Figure 3. As a rule-of-thumb, riffle crests are approximately spaced at an averaged interval of 5 to 7 bankfull channel widths. On Davenport Creek, for example, the average bankfull width is approximately 12 ft. Therefore, an RCT survey would, as an initial estimate before heading to the field, require a (7 widths \* 10 ft/width) \* 15 RCTs = 1050 ft long channel segment. Each RCT survey must have a measured streamflow; at least 6 to 8 surveys should be planned that will span the range of typical baseflows and receding storm flows.



*Figure 3. Davenport Creek panoramic with RCTs identified on the photograph.*

Once surveyed at a given streamflow, the RCT depths are ranked to compute the  $\text{RCT}_m$  depth. Results from an RCT field survey conducted by Humboldt State University students for Sullivan Gulch, a  $2.35 \text{ mi}^2$  watershed in Humboldt County, are illustrated in Figure 4. Outlying RCT depths (both shallow and deep) will have minimal effect on the median RCT depth with this large sample size.

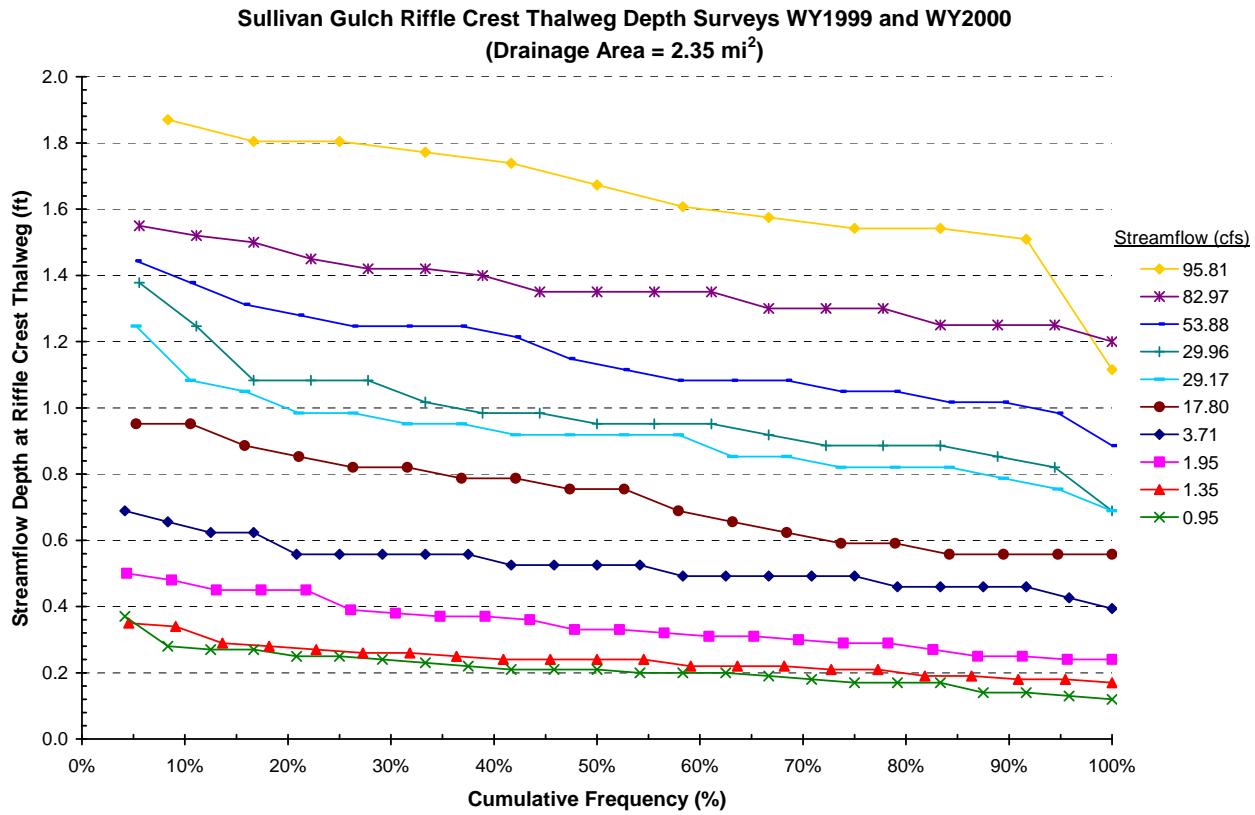


Figure 4. RCT surveys for Sullivan Gulch in Humboldt County.

(Comment: We recommend using of the 50th percentile RCT ( $RCT_m$ ) rather than a lower percentile RCT depth (e.g., the 10th percentile RCT depth) for constructing a  $Q - RCT_m$  curve. One possible objection to this approach is that only one shallow riffle is needed to delay or prevent adult migration. However, the RCT depth survey and construction of a  $Q - RCT_m$  curve are not fish passage assessments. Rather, both are meant to establish a reference point, by quantifying the overall hydraulic behavior of a small stream channel. An ever-expanding RCT survey (farther downstream and/or upstream) will eventually encounter “worse” riffles with respect to fish passage. Thus the 10th percentile RCT depth will keep changing with sample size, whereas the median RCT will remain relatively constant. Using either the median or a lower percentile, outlier riffles, culverts, or rockfalls that behave very differently will need to be investigated individually.)

Once RCT depths at multiple streamflows have been surveyed, the median RCT depth can be plotted as a function of streamflow (the  $Q - RCT_m$  curve) and fit to a mathematical function. Median RCT depths plotted against streamflow for Sullivan Gulch are illustrated in Figure 5. Protocols for identifying  $Q_s$  and  $Q_{WLF}$ , and for recommending specific diversion rates, will require this  $Q - RCT$  curve.

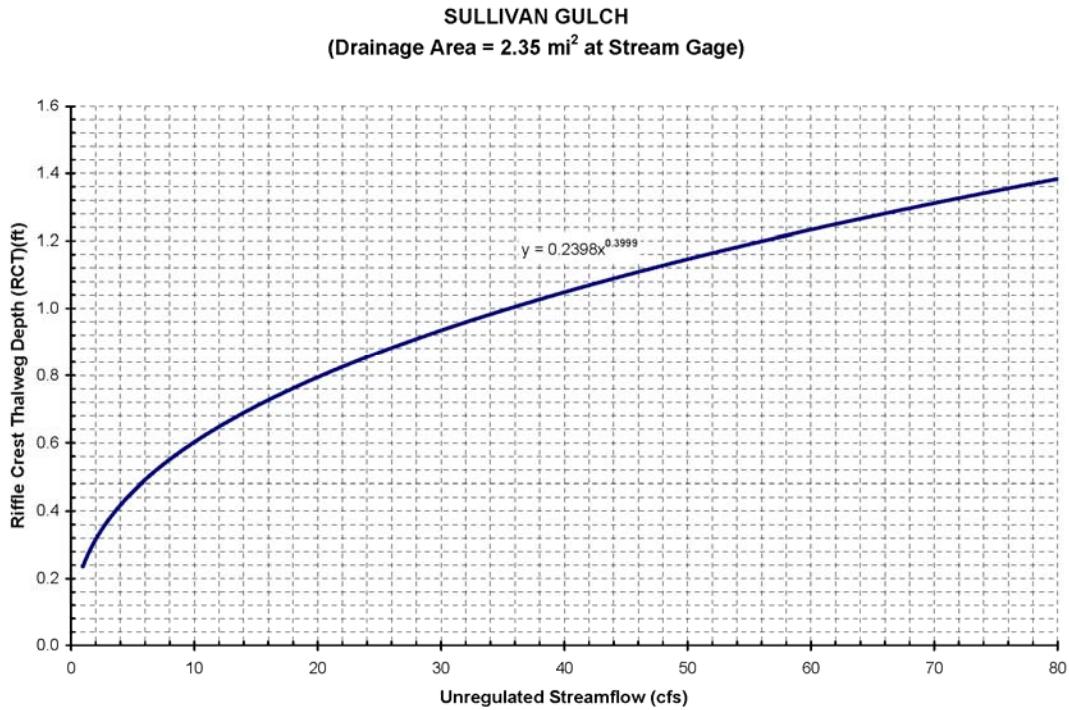


Figure 5. The  $Q - RCT_m$  curve for Sullivan Gulch in Humboldt County.

### III. The Salmon and Steelhead Spawning and Migration Flow Threshold ( $Q_s$ )

The Salmon and Steelhead Spawning and Migration Flow Threshold (“Salmon Spawning Flow” or  $Q_s$ ) is a streamflow threshold important for protecting two steelhead and salmon life history functions in small North Coast California streams: (1) maintaining natural abundance and availability of spawning habitat; and (2) minimizing unnatural adult exposure, stress, vulnerability, and delay during spawning migration.

The first objective for establishing  $Q_s$  is accomplished by positioning  $Q_s$  on the right side of the spawning habitat rating curve as described below. Doing so will protect a range of habitat available at different flows. The second objective is accomplished by identifying a maximum diversion rate that will protect streamflows at and above  $Q_s$ . Flows at  $Q_s$  will cover the backs of migrating fish, which will minimize unnatural adult exposure, stress, vulnerability, and delay during spawning migration.

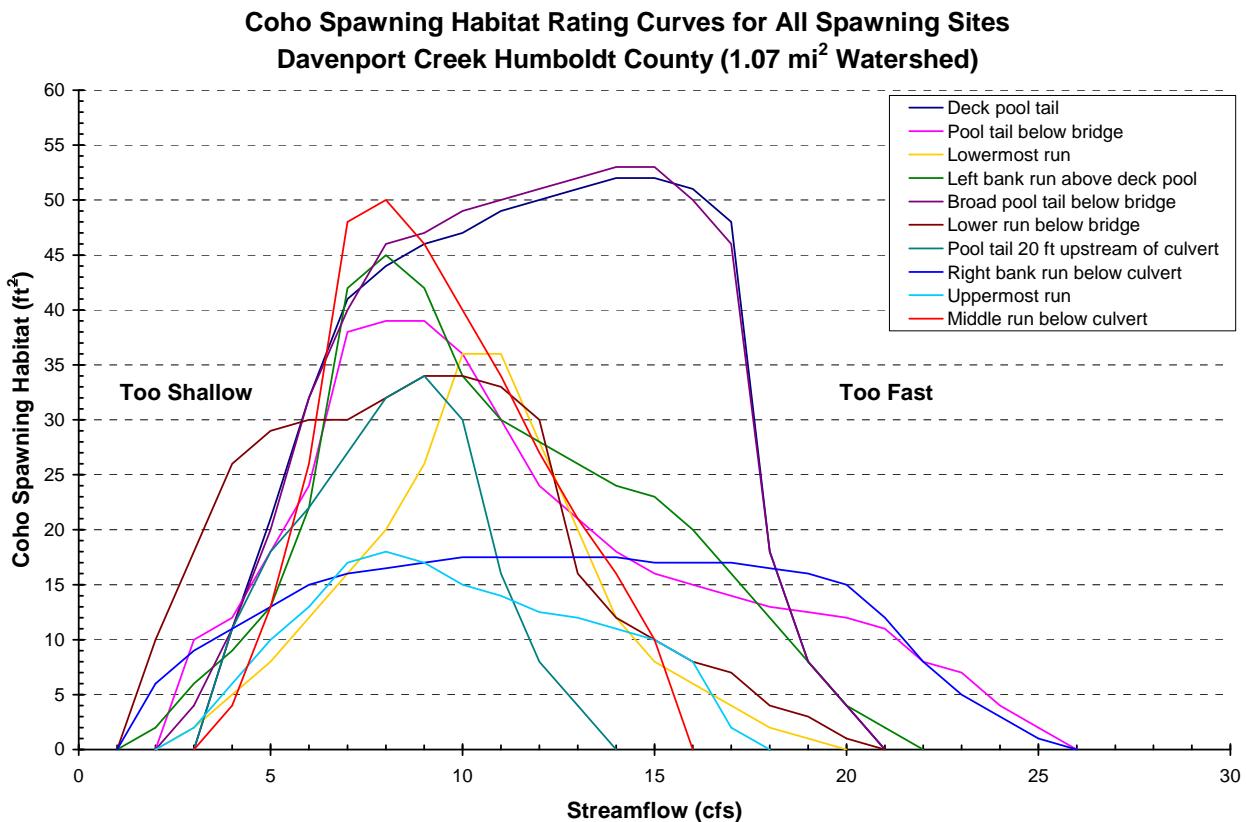
### Methodology Based on Habitat Mapping

The first step for estimating  $Q_s$  is to measure the area ( $\text{ft}^2$ ) of spawning habitat over the full range of streamflows so as to understand the relationship between streamflow and spawning habitat abundance. In small North Coast California streams, microhabitat mapping (going by many other names, though all very similar) is well-suited for quantifying spawning habitat.

Habitat suitability criteria (HSC) are the foundation for credibly assessing habitat abundance. Such criteria must define quantifiable hydraulic (depth, velocity), substrate, and cover (e.g., overhanging stream banks, submerged vegetation, large wood) conditions favored by salmonids as highly suitable (“good”) habitat. These criteria have been developed for other instream flow methodologies, such as PHABSIM, and are utilized in mapping spawning habitat for steelhead, Chinook salmon, and coho salmon. For example, water depth and mid-column velocities identifying good steelhead habitat for yearling steelhead can have depths ranging from 0.5 ft to 1.5 ft deep and velocities ranging from 0.5 ft/sec to 1.5 ft/sec. Sometimes, the criteria can be developed by underwater observation within the stream being investigated; otherwise, the scientific literature is consulted.

With HSC established (guided by agency fish biologists), fish biologists then go into the field and measure where these criteria collectively exist in the channel for each species life stage being investigated, over a range of pre-determined streamflows. This can be done simply, especially for small streams, using a stadia rod and velocity meters. When a habitat patch (also considered a microhabitat) has been identified, measured, and outlined (now called a habitat “polygon”), the polygon’s shape must be reliably transferred onto a basemap or other reference. This basemap can be an aerial photograph with easily distinguished features so biologists can map the polygons onto the basemap. GPS techniques are gaining favor, especially as the technology improves and satellites become more accessible. In small streams, simple still might be better. An approach that triangulates the boundaries of each measured polygon to fixed benchmarks (rebar stakes) using two measuring tapes can precisely transfer the measured polygons into a coordinate system for computing the area of each polygon.

The channel is repeatedly mapped over a pre-determined range of streamflows. Polygon areas are tallied for each streamflow and then plotted as a function of the measured streamflow. This spawning habitat rating curve, with the X-axis =  $Q$  (cfs) and the Y-axis = spawning habitat ( $\text{ft}^2$ ), is the basis for estimating  $Q_s$ . (See Figure 6.)



*Figure 6. Individual coho spawning habitat rating curves for the 10 spawning sites in Davenport Creek.*

Depths of flow at the RCT are used to estimate flows needed for fish passage and migration as well as spawning habitat. Minimum fish depths for passage and migration are assigned to the three primary anadromous species in North Coast California at a level that does not expose the back of a migrating fish. A median riffle crest thalweg (RCT) depth of 0.7 ft deep is considered a conservative minimum depth for inundating an adult steelhead swimming 0.10 ft off the channelbed. A median RCT depth of 0.8 ft deep is considered a conservative minimum depth for inundating an adult coho salmon swimming 0.10 ft off the channelbed. A median riffle crest thalweg depth of 1.0 ft deep is considered a conservative minimum depth for inundating an adult Chinook salmon swimming 0.10 ft off the channelbed.

### Habitat Mapping Method Demonstrated by Example

In this example, Bill Trush mapped coho salmon spawning habitat in an approximate 700 ft reach of Davenport Creek (named locally), a tributary of Lindsay Creek within the Mad River watershed of Humboldt County. The creek's drainage area at the stream gauging station is 1.07 mi<sup>2</sup>. Q<sub>AVE</sub> equals 3.42 cfs. Davenport Creek meanders through this reach, and Trush has been observing and measuring coho salmon migration and spawning in Davenport Creek since November 2001. Taking advantage of extensive field observations, as well as using preferred depth, substrate, and velocity criteria, coho spawning habitat was mapped (using a modified head rod to check water velocities) over the full range of streamflows wherever habitat was found.

Davenport Creek is a small stream, with a 7-10 ft wide channel. Streamflows between 3 and 6 cfs provide minimally sufficient depths for spawning, whereas streamflows approaching 22 cfs rapidly become too fast (Figure 7). The window of favorable streamflows for an adult salmon returning to spawn in small North Coastal California streams is narrow most years.

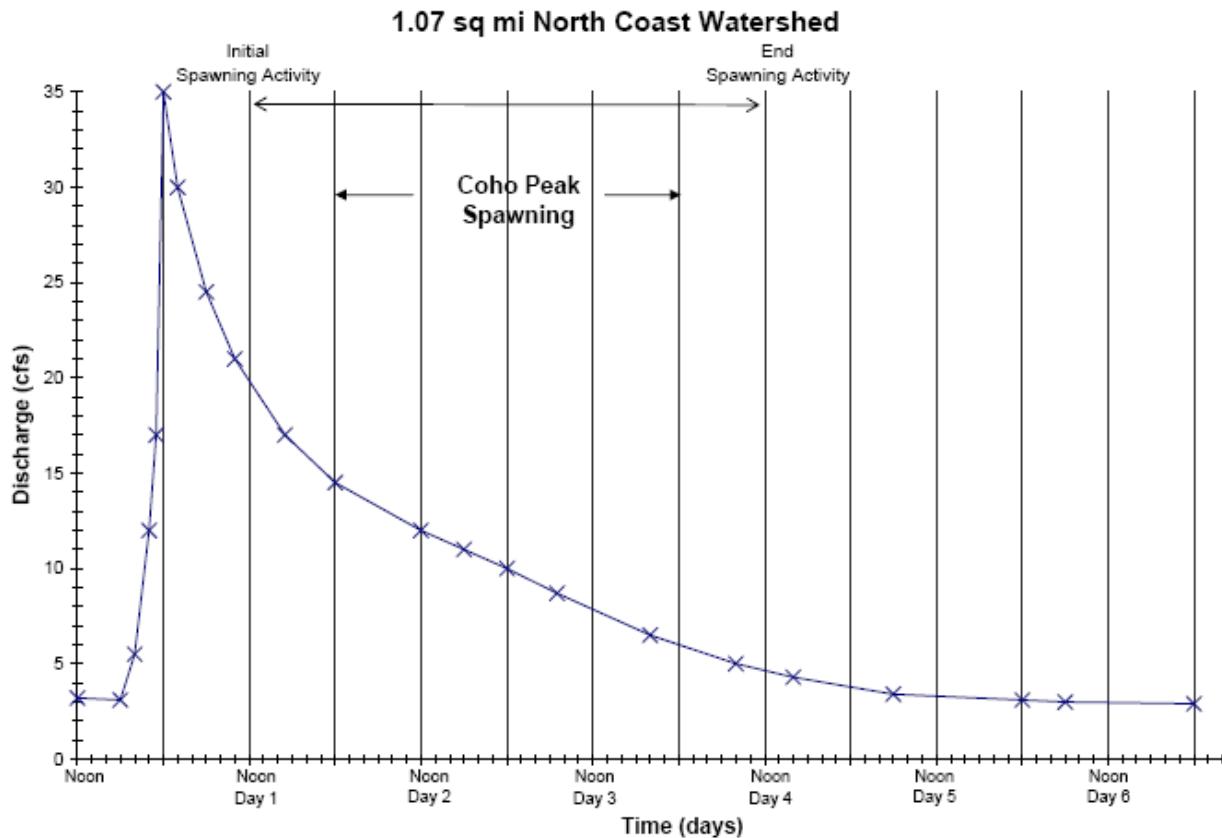


Figure 7. Coho salmon spawning use during a small winter flood.

Coho spawning habitat at 10 channel sites was surveyed to established benchmarks to compute the surface area ( $\text{ft}^2$ ) of each delineated spawning habitat polygon and to document how habitat polygons shifted within each channel site as a function of changing streamflow.

Next, the habitat mapping results are presented by plotting spawning habitat rating curves for each spawning habitat site separately. The 10 individual curves in Figure 6, above, illustrate the hydraulic diversity among the spawning sites that is masked by the composite rating curve (Figure 8). No single rating curve adequately approximates this collective diversity.

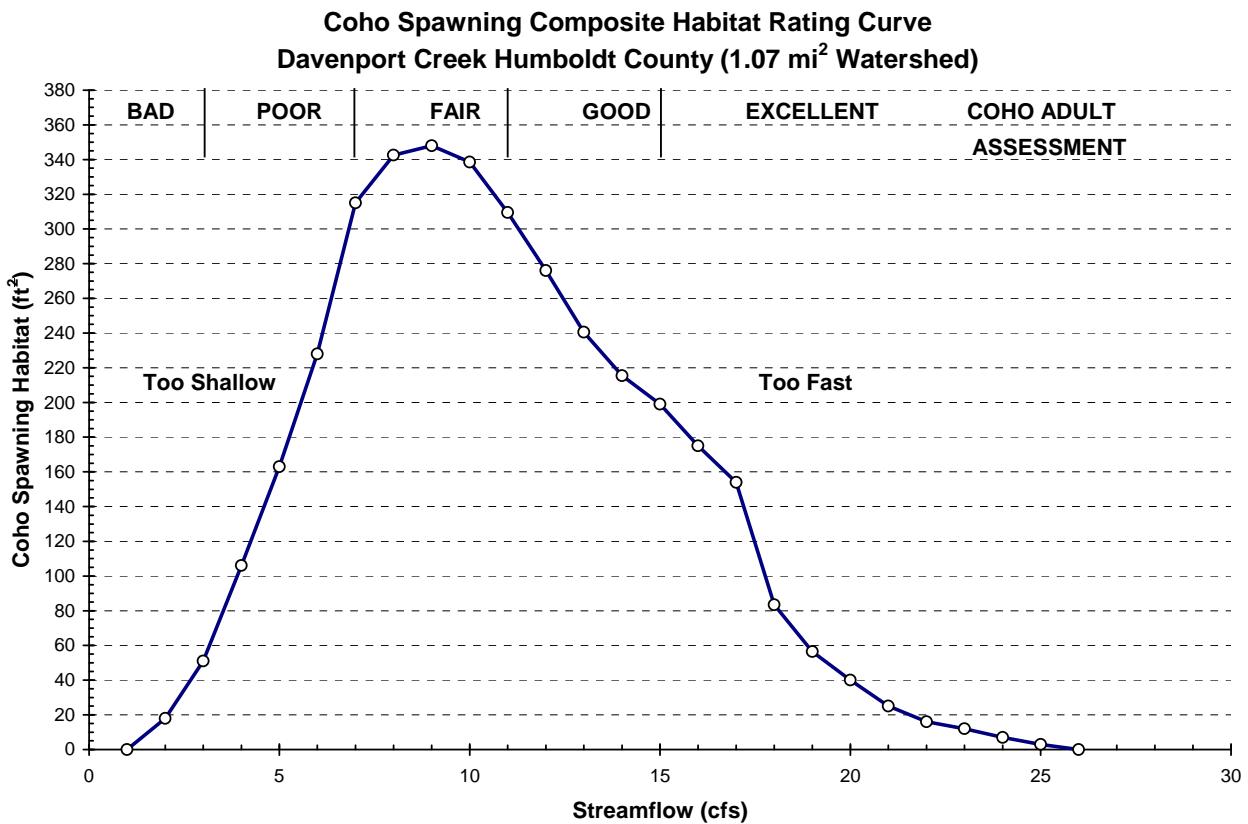
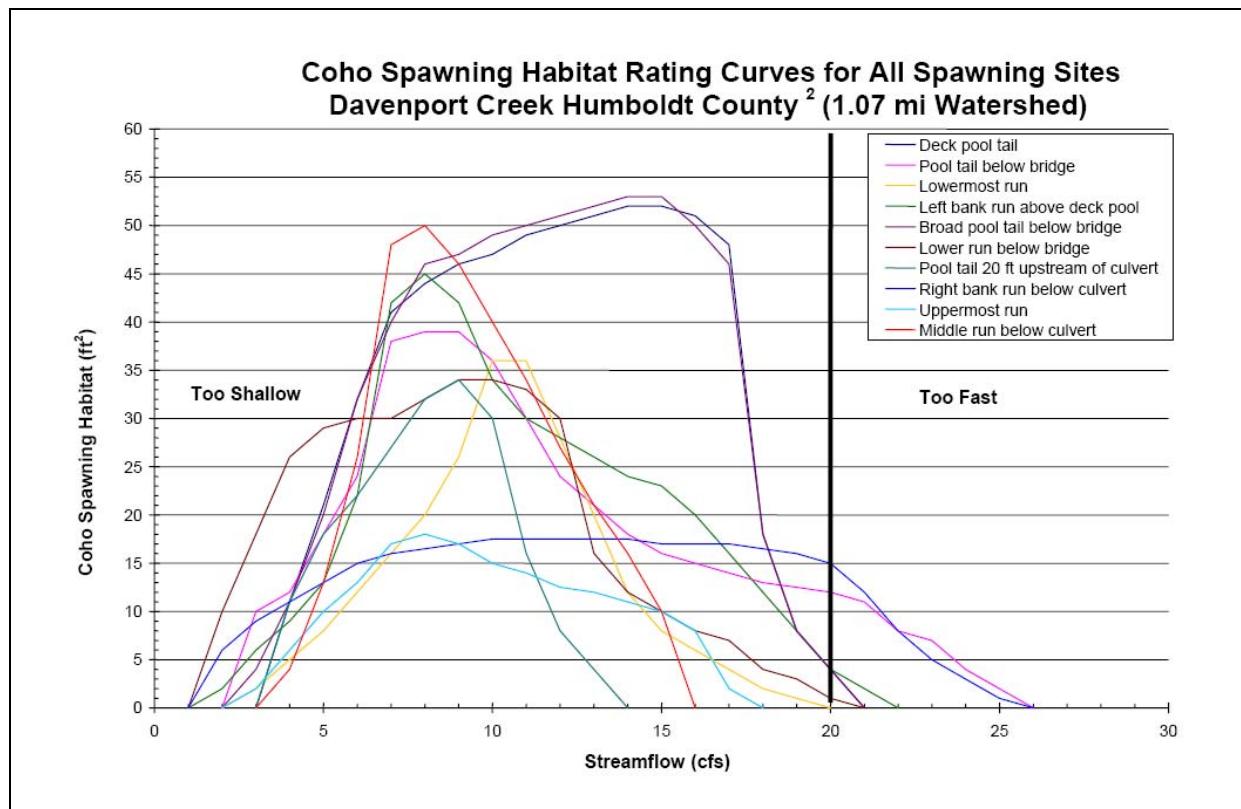


Figure 8. Composite coho salmon spawning habitat rating curve for Davenport Creek.

By contrast, Figure 6, above, highlights the complexity of how channel morphology, streamflow, and fish behavior interact. The Habitat Rating Curves shown in Figure 6 are reproduced below as Figure 9, with Qs shown. The two biggest curves are for broad pool tails, where channel width is approximately 20% greater than the mean width. In contrast, the site with a pronounced platform at 17 cfs (spanning 7 cfs to 19 cfs) is a long, wide run with a lateral bar along its right bank. The three sites with steep, cone-shaped habitat rating curves peaking between 7 cfs and 9 cfs are short pool tails. Ongoing field monitoring is revealing that redds constructed in these short pool tails tend to scour more easily and often during peak winter flows than redds constructed in the runs. Each spawning site offers a unique redd environment that may or may not promote success (fry emergence) depending on the magnitude, duration, frequency, and timing peak streamflows during egg incubation and alevin development. The variety of individual habitat rating curves, therefore, offers risk management to coho salmon trusting their redds to an unpredictable future.



*Figure 9. Figure 6. Individual coho spawning habitat rating curves for the 10 spawning sites in Davenport Creek, with  $Q_s$  shown.*

$Q_s$  could be defined as the highest streamflow that sustains any spawning habitat;  $Q_s$  would be 26 cfs. The proposed methodology protects “good” habitat, rather than accounting for the last square foot of spawnable channelbed, by assigning an adjusted estimate for  $Q_s$  based on spawnable area. In the Figure, the last habitat occurs at 26 cfs, but a minimum area of 15 ft<sup>2</sup> for a single habitat site would put  $Q_s$  at 20 cfs. This methodology excludes more marginal habitat at the highest flows, for example, the “tails” at the far right side of the habitat graph. Another approach for trimming the tails at the far right side of Figure 9 could be to use a percentage of spawnable area.

Our recommended methodology is to set  $Q_s$  at a level to account for all good habitat defined as individual sites with at least 15 ft<sup>2</sup> for coho and 10 ft<sup>2</sup> for steelhead. (I.e., increasing flow does not produce additional spawning locations with areas of those sizes.) Therefore,  $Q_s$  in this example is 20 cfs.

### **Interim Method for Estimating $Q_s$ Based on Fish Passage Depth**

The proposed protocol for prescribing instream flow thresholds and diversion rates depends on quantifying  $Q_s$ . However very few spawning habitat rating curves exist for North Coast California streams especially in small streams with drainage areas less than 5 mi<sup>2</sup>. We propose using streamflows that produce the minimum fish depths at the median RCT as a surrogate for  $Q_s$ . Combined with ecologically sensitive diversion rates, this protocol should be protective for watersheds up to 10 mi<sup>2</sup>. This maximum drainage area may seem small, but almost all water

rights applications for the North Coast are on small streams, so a study method that works for those streams is important.

Stage height for  $Q_s$  at the  $RCT_m$  is estimated by selecting the “fish depth” appropriate to the diversion. If only steelhead spawn in the vicinity of the POD, then  $Q_s$  is assigned a  $RCT_m$  depth of 0.7 ft. If steelhead and coho salmon spawn in the vicinity of the POD, then  $Q_s$  is assigned a  $RCT$  depth of 0.8 ft. If all three species are present,  $Q_s$  is assigned a depth of 1.0 ft.

This approach requires an assessment of the Upper Limit of Spawning Habitat for each anadromous salmonid species. Where the project is above the Upper Limit of Spawning Habitat but still requires calculation off  $Q_s$  (this will happen only where there are large cumulative effects), the methodology directs the studies to the nearest downstream reach of anadromous fish habitat. Where the applicant uses a depth of 0.7 or 0.8 because only steelhead, or steelhead and coho, are present in the vicinity of the POD, but other species are present farther downstream within the same basin, then the applicant shall take steps to ensure that assigning  $Q_s$  a depth based only on the most upstream habitat also serves to protect spawning and migration flows for fish farther downstream. (This should be possible using desktop depletion analysis, because in most cases the area of greatest cumulative effect will be nearest the diversion.)

The streamflow magnitude for  $Q_s$  is estimated by associating the selected  $RCT_m$  depth with streamflow in the  $Q - RCT$  curve constructed from the  $RCT$  field surveys.

This method will be reviewed and could be adjusted based on the results of site specific studies using the habitat mapping methodology.

### **Example**

For example, Chinook salmon spawn above the stream gage on Sullivan Gulch. Using the Chinook salmon fish depth of 1.0 ft for the  $RCT_m$  at  $Q_s$ , the estimated streamflow magnitude for  $Q_s$  would be 35 cfs at the stream gage in Sullivan Gulch (Figure 5). The microhabitat mapping method resulted in a  $Q_s$  of approximately 32 cfs.

### **Assessment of Unusual Circumstances**

Whether using the microhabitat mapping method or the method based on fish depths, the site-specific study must consider unusual circumstances that might exist downstream of the diversion. For example, if a diversion positioned 0.5 mile upstream of a cascade, waterfall, or road crossing that is passable but presents the most obvious limiting point in the vicinity of the diversion, the site-specific study might focus on flows needed for passage at that limiting point.

### **Initial Regional Estimate**

*To be re-calculated by SWRCB staff.*

## **IV. The Winter Low Flow Threshold ( $Q_{WLF}$ )**

The Winter Low Flow Threshold ( $Q_{WLF}$ ) is a streamflow threshold important to managing several steelhead and salmon life history needs in small North Coast California streams: (1) maintaining good benthic macroinvertebrate habitat in riffles to foster high stream productivity, (2) preventing redd desiccation and maintaining hyporeic subsurface flows, (3) sustaining high quality and abundant juvenile salmonid winter rearing habitat, and (4) facilitating smolt out-migration.

### **Methodology Based on Habitat Mapping**

Productive benthic macroinvertebrate (BMI) habitat is important to rearing healthy salmonid juveniles. An instream flow protocol must recognize this aspect of juvenile habitat to complement the more traditional concern for habitat abundance. Productivity is extremely difficult to measure. As a surrogate for productivity, we propose measuring riffles that provide good physical conditions for productive BMI habitat. For small North Coast California streams, highly productive BMI habitat can be habitat-mapped using the following physical criteria: (1) the median particle size of the rifflebed is inundated (establishing a minimum depth) and (2) the average column velocity is greater than 1.5 ft/sec. The median particle is estimated as the  $D_{50}$  from a standard 100 rock-count inventory. A productive BMI habitat – streamflow rating curve can be measured on the stream using habitat mapping. The resulting habitat rating curve would have  $Q$  (cfs) on the X-axis and productive BMI habitat ( $ft^2$ ) on the Y-axis. With no maximum depth or velocity criteria, this BMI habitat rating curve will ramp-up to an asymptote as riffles are inundated bank-to-bank and velocities across the riffle exceed 1.5 ft/sec. All riffle habitats should be habitat-mapped in a channel length at least 30 bankfull widths long. Each riffle within this sample reach should be plotted separately and as one composite (the same as recommended for the spawning habitat rating curves). The recommended winter low flow ( $Q_{WLF}$ ) would be estimated at the overall asymptote of the BMI habitat rating curves for each riffle assessed.

Similar methodological approaches to quantifying juvenile salmonid rearing habitat and amphibian habitat would appear obvious tasks for developing  $Q_{WLF}$ . However, streamflows sustaining good juvenile rearing habitat will range from low streamflows below  $Q_{WLF}$  through high streamflows exceeding  $Q_s$ . We do not propose that juvenile rearing habitat or amphibian habitat be mapped, though it could be done. The policy presumes that the  $Q_{WLF}$  and  $Q_s$  thresholds, in combination with the proposed protocols for determining diversion rates, will sustain good juvenile rearing habitat in small North Coast California streams. Flows at  $Q_{WLF}$  will maintain good BMI productivity, prevent redd desiccation and maintain hyporeic subsurface flows. Flows at the  $Q_{WLF}$  threshold also support smolt outmigration.

Whenever considering baseflows, water temperature should be integral to an instream flow investigation and protocol. Given the time period in the policy for winter habitat (December 15 through March 31), however, we did not consider water temperature to be a factor of concern in small North Coast California streams.

### **Interim Methodology Based on Depth**

To our knowledge, no BMI habitat rating curve has been constructed for a small North Coast California stream (we have one under construction for Davenport Creek). An interim

methodology for estimating  $Q_{WLF}$  for small North Coast California streams is to use the streamflow at the median RCT that inundates the dominant particle size of the riffles (quantified as the  $D_{84}$  in a 100 rock-count). If the riffle  $D_{84}$  is 120 mm (0.39 ft), the streamflow at 0.39 ft on the median RCT – Q curve would be the estimated  $Q_{WLF}$ .

This method will be reviewed and could be adjusted based on the results of site specific studies using the habitat mapping methodology.

### **Initial Regional Estimate**

In lieu of doing the rock counts, and until field studies with BMI habitat mapping are completed,  $Q_{FEB}$  may be used as a proxy for  $Q_{WLF}$  in small North Coast California streams.

This method will be reviewed and could be adjusted based on the results of site specific studies using the habitat mapping methodology.

### **Example**

Initial results for Davenport Creek give a  $Q_{WLF}$  of 5.52 cfs based on the  $D_{84}$  method (0.3 ft), which is similar to  $Q_{FEB}$  (= 4.82 cfs). Differences in stage height at the median RCT among these streamflows are small.

## **V. Examples of Rate of Diversion Calculations**

Diversions can be expressed as a change in water surface depth at the  $RCT_m$ . An allowable maximum diversion should cause no more change in depth than determined potentially harmful to migrating adult salmonids and that could impair other ecological processes previously identified (i.e., 0.05' when  $Q_{WLF} < Q_D < Q_s$ , and 0.1' when  $Q_s < Q_D$ ).

This change in depth is then converted to a diversion rate (cfs) at  $Q_s$  using the Q -  $RCT_m$  rating curve (Figure 5, above). Note that the percent diversion rate changes with streamflow magnitude. The inter-relationship of diversion rate, to produce a 0.05 or 0.1 ft drop in depth, and the percentage of the unregulated streamflow this rate requires is illustrated in Figure 9 for Davenport Creek and Figure 10 for Sullivan Gulch.

Rates of diversion are set so that the diversion causes no more than 0.05 ft change in depth at any of the flows producing depths between  $Q_{WLF}$  and  $Q_s$ , or so as to cause not more than 0.1 ft change in depth when flows are just above  $Q_s$ , as described in the policy.

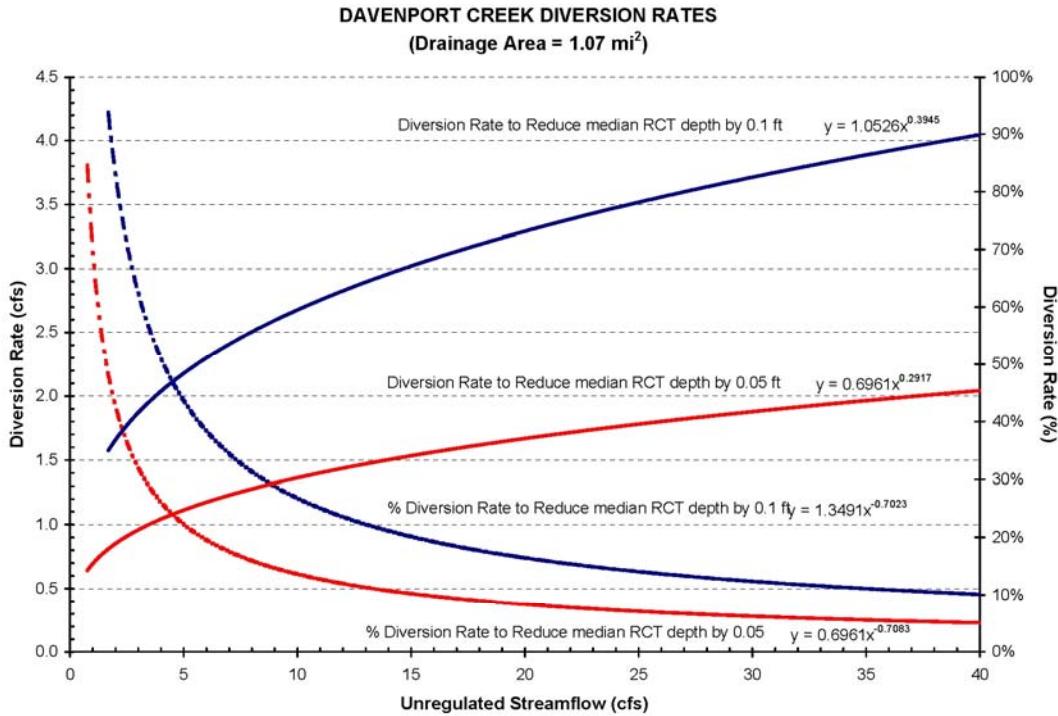


Figure 10. Fixed diversion rates as a function of unregulated streamflows for Davenport Creek at 0.10 ft and 0.05 ft diversion rates.

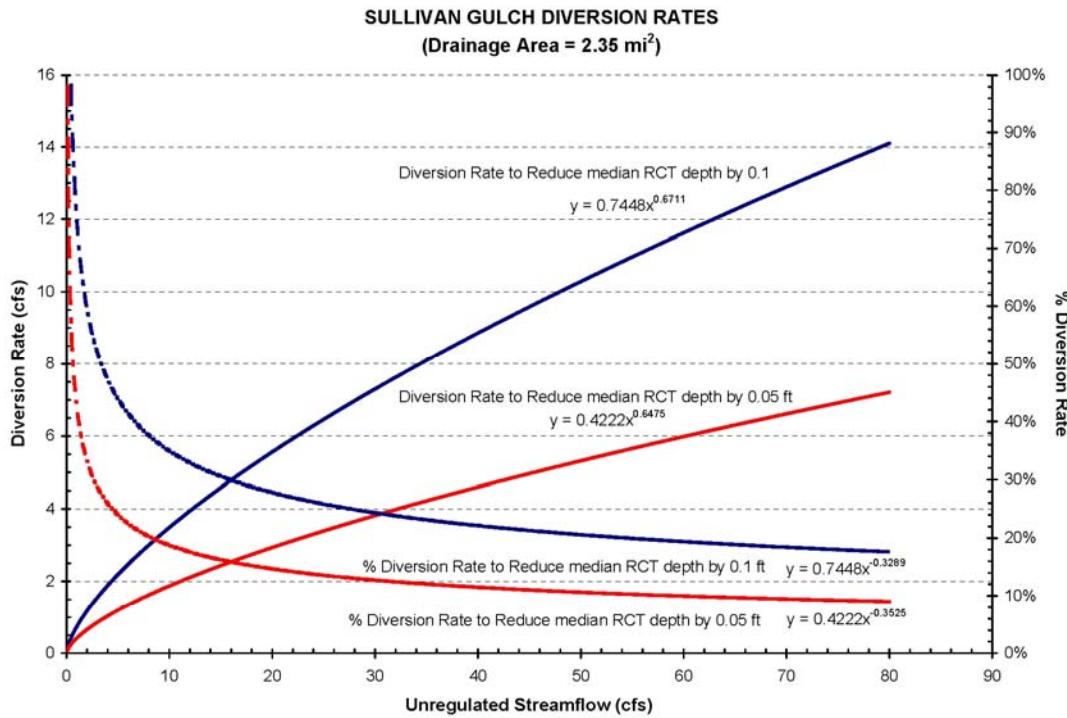


Figure 11. Fixed diversion rates as a function of unregulated streamflows for Sullivan Gulch at 0.10 ft and 0.05 ft diversion rates.