

Lower Tuolumne River Instream Flow Study  
Study Coordination Meeting #4 – Summary  
Wednesday, October 20, 2010, 9 AM - 5 PM Stillwater Sciences  
279 Cousteau Place, Davis, CA

Attendees:

Scott Wilcox (Stillwater)  
Russ Liebig (Stillwater)  
Bob Hughes (CDFG)  
Ron Yoshiyama (CCSF-SF)

Allison Boucher (TRC)  
Mark Gard (USFWS)  
Jim Inman (FishBio)

The purpose of this workshop was to compile, review, and discuss available steelhead Habitat Suitability Criteria (HSC) for the lower Tuolumne River, select remaining HSC where possible, identify additional HSC literature data gathering needs, and discuss related topics. Chinook salmon HSC were discussed at the September 20, 2010 workshop. Scott Wilcox provided a brief overview of remaining action items from the September 20 workshop and introduced the revised *O. mykiss* HSC data packet, which was expanded to include additional rainbow trout curves following the September 20 meeting.

The technical group sequentially reviewed *O. mykiss* HSC and associated metadata from various sources for each lifestage, and either (1) selected HSC, (2) reduced the sources of HSC being considered, and/or (3) identified data needs and next steps. Decisions and/or actions on HSC for each species and lifestage are noted below.

***O. mykiss* Adults**

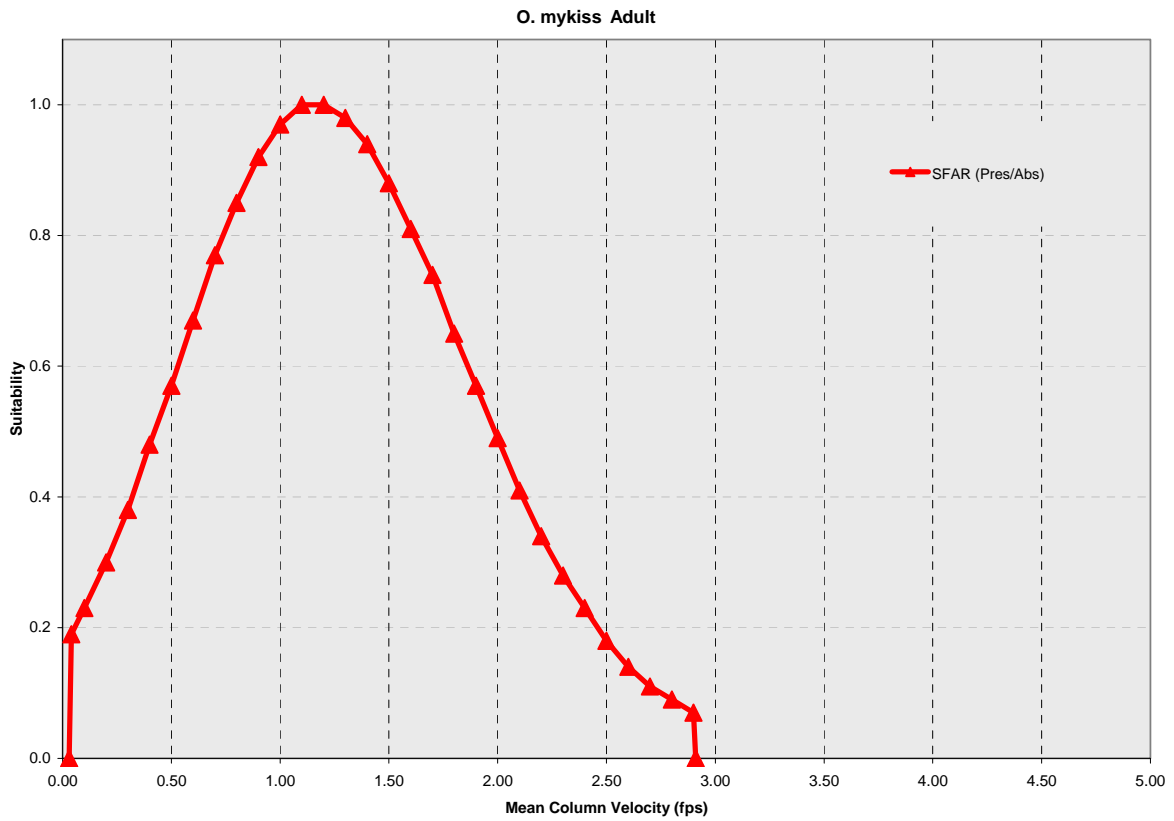
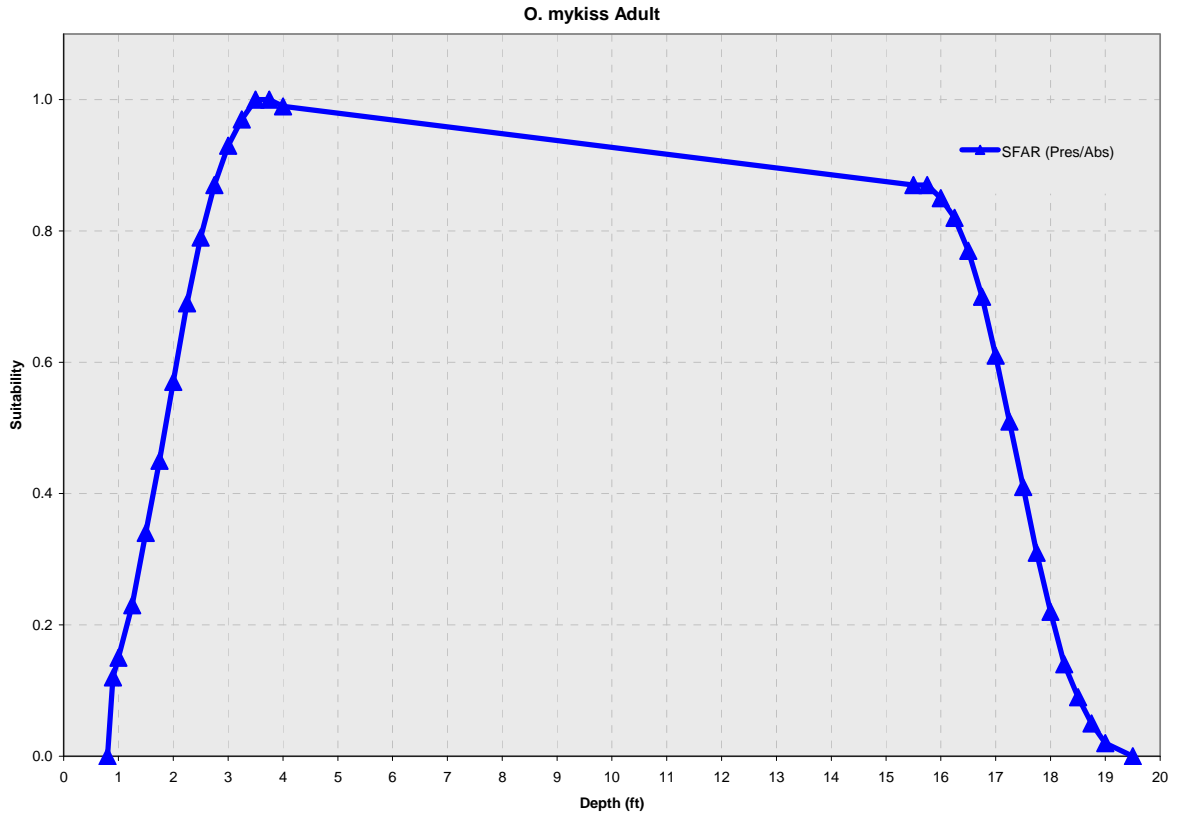
- The technical group had reviewed HSC during the September 20, 2010 workshop and initially focused on resident rainbow trout curves provided by the USFWS that are being used for the Merced project (SF American logistic regression curve). However, since the Tuolumne River *O. mykiss* population is almost entirely resident, the technical group concurred that review of additional Central Valley rainbow trout curves should be considered as well. Stillwater subsequently compiled additional rainbow trout HSC for comparison and consideration, and Bob Hughes reviewed the origin of the Merced curves. All of these data were reviewed and discussed by the group on October 20.
- The process for HSC selection generally used the following steps: 1) review tabular metadata for all HSC; 2) "filter" HSC datasets to consider further based on selection criteria in the study plan such as number of observations, category of criteria, geography, stream similarity, elevation, etc.; 3) review graphs of filtered HSC and discuss outliers, representative datasets, or development of a consensus curve.

- **Decision:** The workshop group concurred on use the South Fork American River Logistic Regression (Pres/Abs) curves ("SFAR Pres/Abs") proposed by the USFWS for both velocity and depth.

**Tuolumne River *O. mykiss* Adults Depth and Velocity Criteria\***

Velocity (fps)	Suitability Index	Depth (ft)	Suitability Index
0.03	0.00	0.80	0.00
0.04	0.19	0.90	0.12
0.10	0.23	1.00	0.15
0.20	0.30	1.25	0.23
0.30	0.38	1.50	0.34
0.40	0.48	1.75	0.45
0.50	0.57	2.00	0.57
0.60	0.67	2.25	0.69
0.70	0.77	2.50	0.79
0.80	0.85	2.75	0.87
0.90	0.92	3.00	0.93
1.00	0.97	3.25	0.97
1.10	1.00	3.50	1.00
1.20	1.00	3.75	1.00
1.30	0.98	4.00	0.99
1.40	0.94	15.50	0.87
1.50	0.88	15.75	0.87
1.60	0.81	16.00	0.85
1.70	0.74	16.25	0.82
1.80	0.65	16.50	0.77
1.90	0.57	16.75	0.70
2.00	0.49	17.00	0.61
2.10	0.41	17.25	0.51
2.20	0.34	17.50	0.41
2.30	0.28	17.75	0.31
2.40	0.23	18.00	0.22
2.50	0.18	18.25	0.14
2.60	0.14	18.50	0.09
2.70	0.11	18.75	0.05
2.80	0.09	19.00	0.02
2.90	0.07	19.50	0.00
2.91	0.00		

\* From USFWS 2004: Flow-habitat relationships for adult and juvenile rainbow trout in the Big Creek Project. USFWS Energy Planning and Instream Flow Branch. 31pp.



***O. mykiss* Spawning**

A wide range of HSC from various sources were reviewed; however, one single curve could not be identified to best fit the *O. mykiss* populations in the Tuolumne River. Therefore envelope curves were developed for depth and velocity, and a curve reflecting the central tendency of the data was developed for substrate, based on the Upper Trinity and Yuba curves.

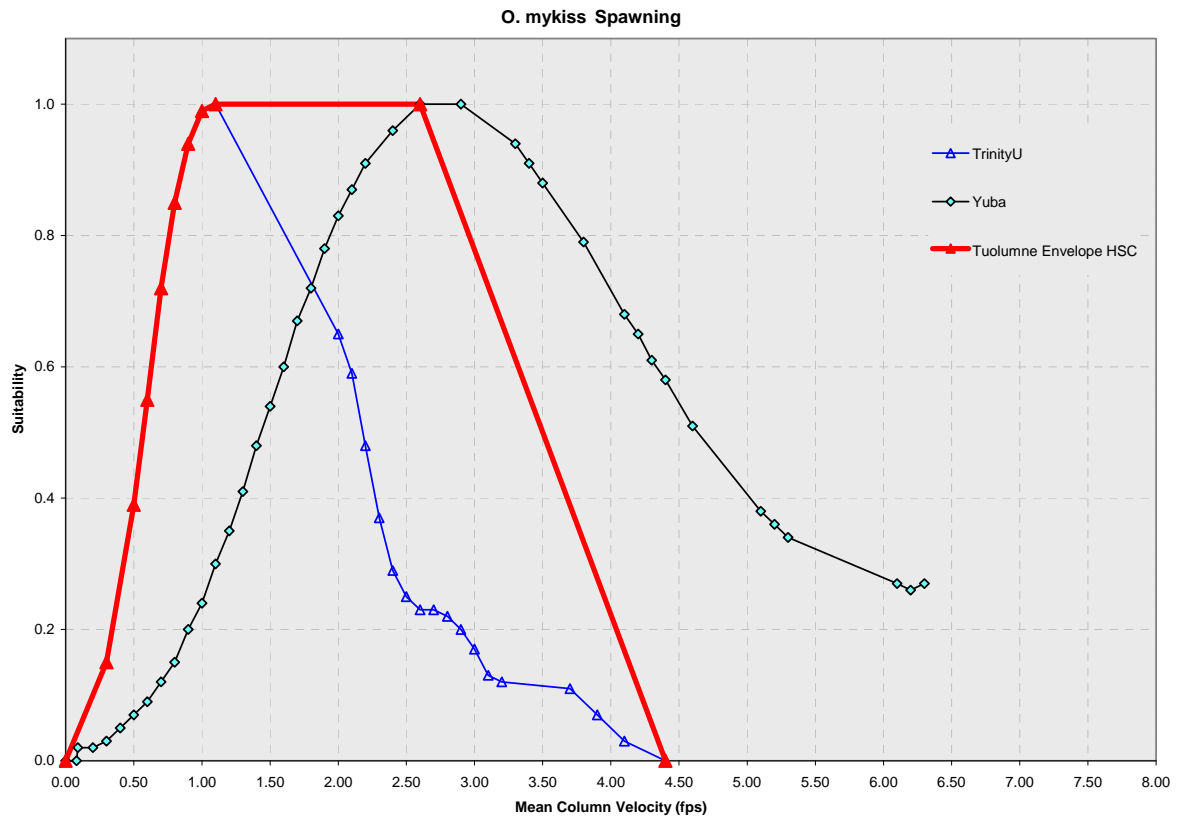
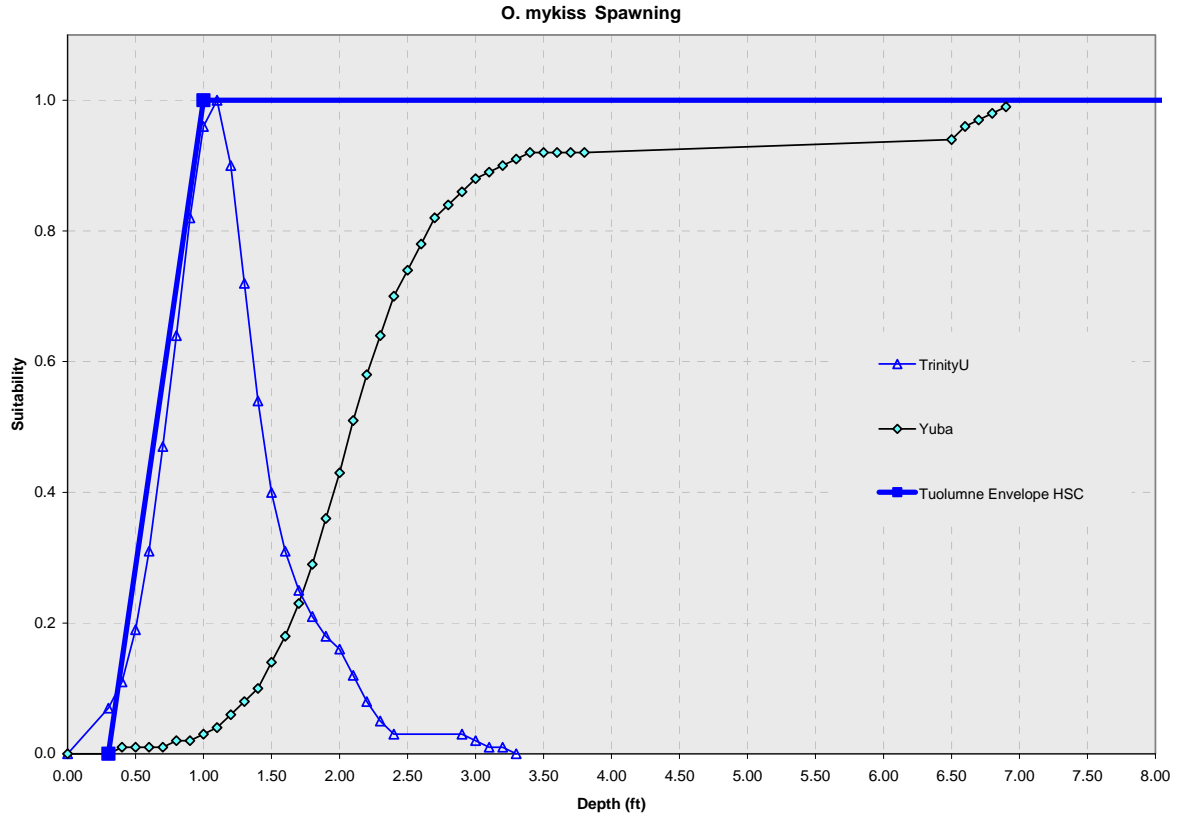
- **Decision:**
  - Velocity: Use an envelope curve including the ascending limb of the Upper Trinity curve to (x, y = 1.1, 1.0) over to (2.6, 1.0) of the Yuba curve, then straight-line down to (4.4, 0.0).
  - Depth: Use an envelope curve from (0.3, 0.0) to (1.0, 1.0) to (100.0, 1.0).
  - Substrate: Final substrate criteria agreed to by the technical group are specified below.

**Tuolumne River *O. mykiss* Spawning Depth and Velocity Criteria**

Velocity (fps)	Suitability Index	Depth (ft)	Suitability Index
0.00	0.00	0.30	0.00
0.30	0.15	1.00	1.00
0.50	0.39	100.00	1.00
0.60	0.55		
0.70	0.72		
0.80	0.85		
0.90	0.94		
1.00	0.99		
1.10	1.00		
2.60	1.00		
4.40	0.00		

**Tuolumne River *O. mykiss* Spawning Substrate Criteria**

Substrate	Size (inches)	Suitability Index
Organic, silt, sand, small gravel	Up to 1.0	0.38
Medium gravel	1-2	1.0
Large gravel	2-3	0.85
Very small cobble	3 - 4.5	0.28
Small cobble	4.5-6	0.05
Medium Cobble	6-9	0.00
Large cobble, boulder, bedrock	>9	0.00



***O. mykiss* Fry**

A wide range of HSC from various sources were reviewed that displayed similar results for fry. USFWS Yuba River curves were presented in the "filtered" data sets, but they varied from the central tendency of the other curves due to the statistical approach used to generate them.

- **Action Item:** Mark Gard to provide the underlying histograms and report for the Yuba River *O. mykiss* HSC prior to the November 22 meeting for comparison to other data.

***O. mykiss* Juveniles**

**Decision:** Recommended an envelope curve including the ascending limb of the SF American polynomial regression curve up to  $y=1$ , and across on  $y=1$ , following the descending limb of the SF American logistic regression curve. No substrate criteria to be applied to juveniles.

Upcoming meeting dates:

A third HSC development workshop was tentatively scheduled for November 22, 2010 at Stillwater in Davis, 9:00 AM, but was postponed due to subsequent scheduling and data availability conflicts. The next workshop is anticipated in early January.

**Tuolumne River *O. mykiss* Juvenile Depth and Velocity Criteria**

Velocity (fps)	Suitability Index	Depth (ft)	Suitability Index
0.00	0.73	0.40	0.00
0.05	0.81	0.50	0.24
0.15	0.93	0.70	0.56
0.25	0.99	0.90	0.78
0.35	1.00	1.10	0.92
0.80	1.00	1.30	0.99
0.90	0.99	1.50	1.00
1.00	0.98	2.25	1.00
1.10	0.96	2.50	0.98
1.20	0.92	2.75	0.93
1.30	0.89	3.00	0.86
1.40	0.84	3.25	0.78
1.50	0.79	3.50	0.70
1.60	0.74	3.75	0.62
1.70	0.68	4.00	0.54
1.80	0.63	4.25	0.47
1.90	0.57	4.50	0.41
2.00	0.51	4.75	0.36
2.10	0.46	8.75	0.34
2.20	0.41	9.00	0.34
2.30	0.36	9.25	0.33
2.40	0.31	9.40	0.31
2.50	0.27	9.50	0.00
2.60	0.24		
2.70	0.20		
2.80	0.17		
2.85	0.16		
2.86	0.00		

