

**From:** Jackson, Zachary [[mailto:zachary\\_jackson@fws.gov](mailto:zachary_jackson@fws.gov)]

**Sent:** Thursday, November 21, 2013 2:37 PM

**To:** Staples, Rose; Devine, John

**Cc:** Alison Willy; Ramon Martin; Mark Gard; Deborah Giglio; Annie Manji; Barnes, Peter@Waterboards; Allison Boucher

**Subject:** Lower Tuolumne River Instream Flow Study...: 1-D PHABSIM habitat suitability criteria review

Dear Rose and John,

I have reviewed the technical memorandum from Stillwater Sciences summarizing habitat suitability criteria (HSC) that was provided on October 30, 2013. I believe that this study will be improved by the inclusion of some additional information and be useful in developing Project license conditions.

Growth, recruitment, and mortality are the primary functions that regulate fish population dynamics and thereby influence the ecology and management of fishes. Recruitment is typically the strongest determinate influencing populations among the three major factors affecting populations. Understanding how the Project affects recruitment of native and introduced species will be critical in developing license conditions. Therefore, I request that the scope of the analyses be expanded to include early life stages (e.g., spawning/incubation, juvenile) of Striped Bass, Largemouth Bass, and Smallmouth Bass. Temperature criteria should also be included for all species so that the weighted usable areas can be accurately quantified. Stuber et al. (1982) and Edwards et al. (1983) include HSC for spawning and incubation, fry, and juvenile Largemouth Bass and Smallmouth Bass, including temperature. Habitat suitability criteria for Striped Bass (spawning, incubation, and larval) is available from EA (1994), which HDR used in their Buckhorn Creek and Cape Fear River Instream Flow Studies. Optimum temperature data for Striped Bass are available from Harrell (1997), and Moyle (2002) includes data and citations to additional temperature data.

E.A. Engineering, Science, and Technology. 1994. Sinclair Hydroelectric Project Relicensing Technical Studies (FERC Project No. 1951). Appendix. Report prepared for Georgia Power, Atlanta, GA.

Harrell, R. M, editor. 1997. Striped Bass and other Morone culture. Developments in Aquaculture and Fisheries Science, Volume 30. Elsevier Science, Amsterdam.

Moyle, P. B. 2002. Inland fishes of California. University of California Press, Berkeley.

I appreciate the opportunity to continue working with all relicensing participants to ensure that studies provide valuable results necessary to inform the development of Project license conditions.

Sincerely,

Zac Jackson  
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San Joaquin River Restoration Program  
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