

Testimony of Thomas P. Keegan Re: the Need for Modification of Permits 11308 and 11310 to Protect Santa Ynez River Steelhead Resources

- **Summary of Cachuma Project and Operational Impacts on Santa Ynez River Steelhead**
- **Current Condition of Santa Ynez River Steelhead**
- **Flow Issues and Steelhead Requirements Below Bradbury Dam**
 - **Upstream passage of adult steelhead**
 - **Spawning**
 - **Fry and juvenile steelhead rearing**
 - **Methods for determining appropriate instream flows**
 - **Overall conclusions for instream flows**
- **Upstream and Downstream Passage Issues Associated with Bradbury Dam**
- **Adaptive Management and Establishment of Target Success Criteria**
- **Summary of Conclusions and Recommendations**



Summary of Cachuma Project and Operational Impacts on Santa Ynez River Steelhead

- **Lack of steelhead access to superior spawning and rearing habitat that exists above Bradbury dam**
- **Substantial alteration of natural hydrograph below Bradbury Dam resulting in adverse effects to all steelhead lifestages**
- **Blockage of recruitment of suitable sized gravel and cobble substrates for steelhead spawning below Bradbury Dam**
 - **Limited availability within wetted channel**



Current Condition of Santa Ynez River Steelhead

- **Application of Peter Moyle's definition of "Good Condition"**
 - **Individual**
 - **Population**
 - **Fish**
 - **Habitat**
 - **Community**



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Upstream Passage of Adult Steelhead*

- **Basic requirements for adult passage**
 - **Thompson Criteria –**
 - **Depth (>0.5' - 0.6')**
 - **velocity (<8'/s)**
 - **length of critical passage (25% or 8' of contiguous stream channel width)**
 - **14 consecutive days of passage (decay function)**
- **BO states 30 cfs provides passage in 38% of years, increasing to 63% with supplemental migration flows to maintain 14 consecutive days which is "close to the minimum at which passage is possible"**
- **Alt. 3A2 in BOR's Cachuma Project Renewal EIS/EIR (1995) achieves successful passage in 84% of years of record**



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Spawning*

- **Basic spawning habitat requirements:**
 - **Depth of 0.6 to 3', preference of 1.1 to 1.3' (size issue);**
 - **Velocity of 1 to 3.6 f/s, preference of 2 f/s**
 - **Substrates of 0.2 to 5" in diameter**
- **IFIM models suitable flows, including above preferences**
 - **IFIM analysis provides WUA for "existing substrate" and for "substrate improvements" (DWR 1989)**
 - **Existing substrate-100 cfs as optimal spawning flow**
 - **Substrate improvement-48 cfs provides corresponding amount of spawning habitat with substrate improvement**
- **Alt. 3A2 in BOR's Cachuma Contract Renewal EIS/EIR provides basic spawning flow requirements**
 - **Improvements to spawning substrate are required**



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Fry Steelhead Rearing*

- **Basic fry habitat requirements:**
 - **Depth of 0.2 to 1.2', preference of 0.5 to .75'**
 - **Velocity preference is <0.75 f/s**
 - **IFIM used for determining suitable flow/WUA relationship, as reported in BOR EIS/EIR**



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Juvenile Steelhead Rearing*

- **Basic juvenile habitat preferences:**
 - **Depth of 0.75 to 2.0 inches, preference of 0.8 to 1.2'**
 - **Velocity of near zero (pools) to 2.0 f/s; preference of 1.2 f/s**
 - **IFIM used for determining suitable flow/WUA relationship, as reported in BOR's Cachuma Contract Renewal EIS/EIR**
- **BO flows primarily focus on improvements to uppermost reach below Bradbury Dam (Hwy 154 Reach - 2.9 miles)**
- **Alt. 3A2 in BOR's Cachuma Contract Renewal EIS/EIR flows provide improved basic habitat requirements for 10.5 miles of lower river: Hwy 154 – 2.9 miles; Refugio - 5.0 miles; and Alisal - 2.6 miles**
 - **Existing substrate-120 cfs as optimal flow (DWR)**
 - **Substrate improvement–22 cfs provides corresponding amount of habitat**
- **Higher inflow provides improved juvenile rearing conditions in lagoon with Alt. 3A2, compared to BO flows**



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Methods for Determining Appropriate Instream Flows*

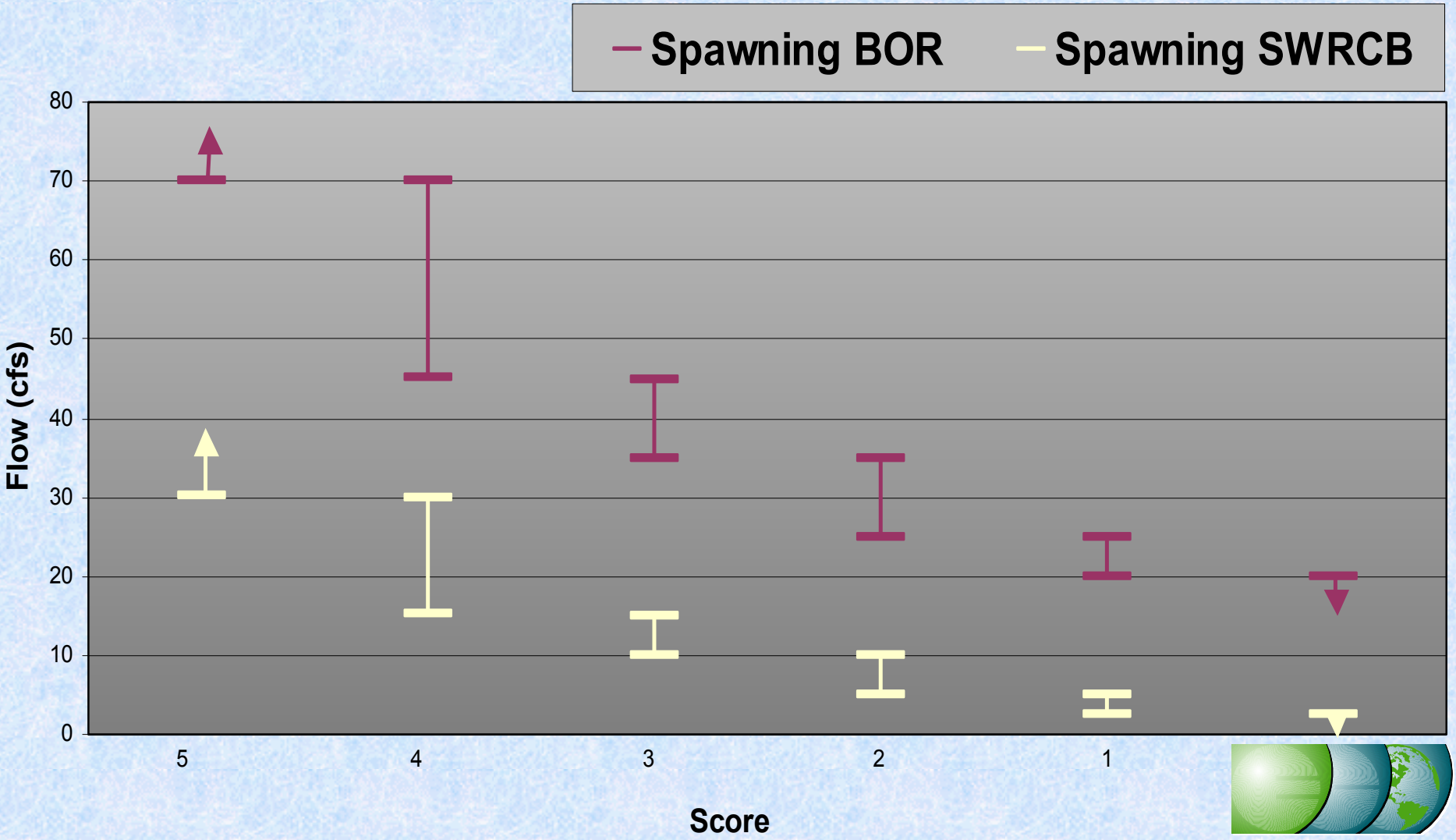
- **IFIM used for determining suitable flow/WUA relationship, as reported in BOR EIS/EIR**
 - **Based on collection of empirical data for simulating habitat**
 - **In particular, provides level of quantification necessary for restoration of endangered species, i.e., Santa Ynez steelhead**
- **Top-width method based primarily on wetted perimeter, which may or may not include useable habitat, as reported in SWRCB DEIR**
 - **Based on less than sufficient empirical data**
 - **Does not provide direct association with HSC for fry and juvenile lifestages**
 - **Does not take into account variation in channel morphology and habitat type**
 - **Large increases in top width do not necessarily correspond to increases in useable habitat**
 - **Analysis focuses on potential fry habitat**



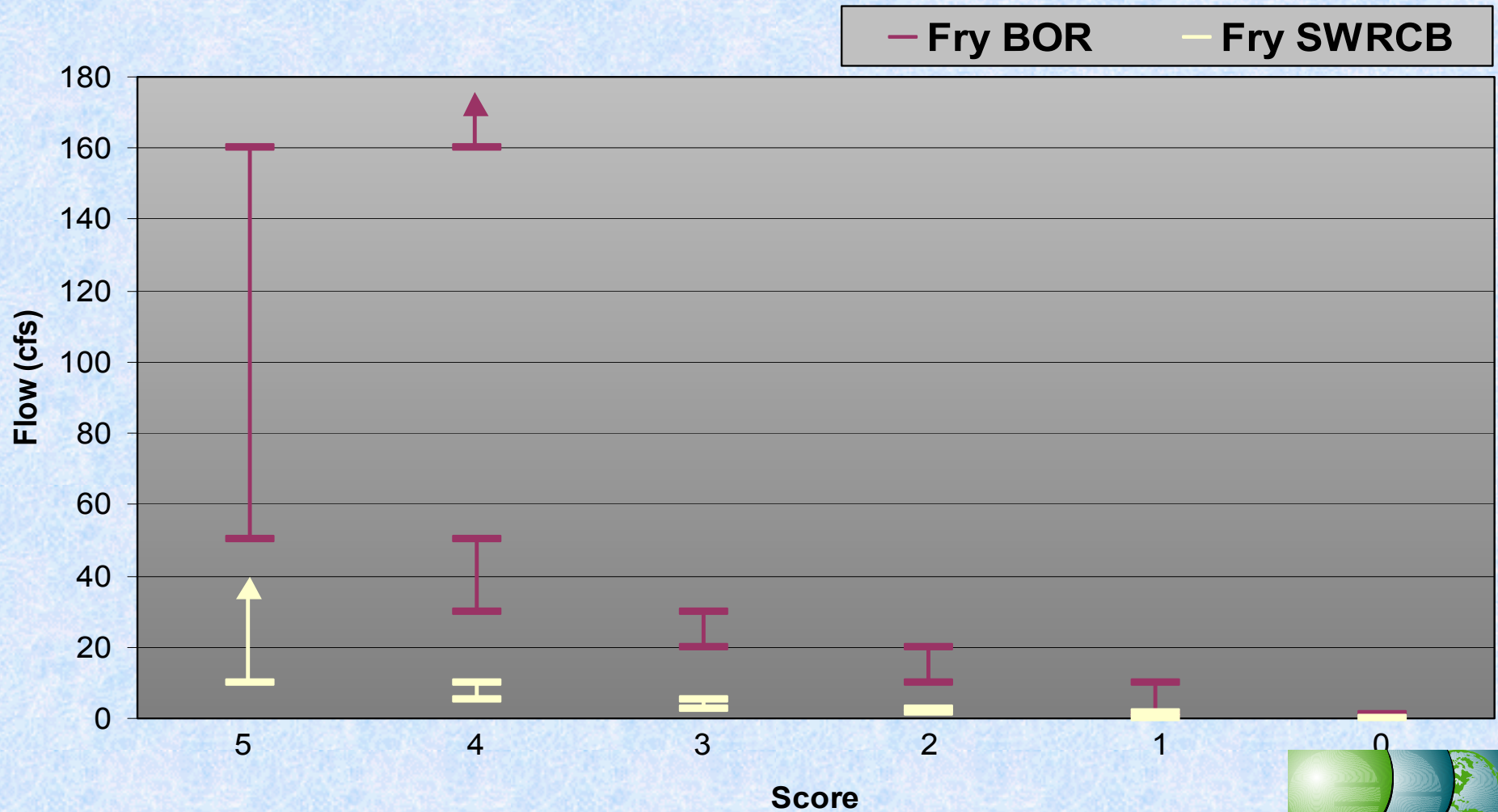
Flow Issues and Steelhead Requirements Below Bradbury Dam – *Focus on Juvenile Steelhead for Rearing Flows*

- **Target rearing flows should focus on juvenile lifestage rather than fry lifestage**
 - **Juvenile steelhead require greater depth and velocities than fry**
 - **Juvenile rearing flows also account for fry rearing flows**
- **Survivorship of juveniles to adult lifestage is significantly greater than fry to adult survivorship**
 - **Mainstem and lagoon rearing is paramount for successful steelhead restoration**

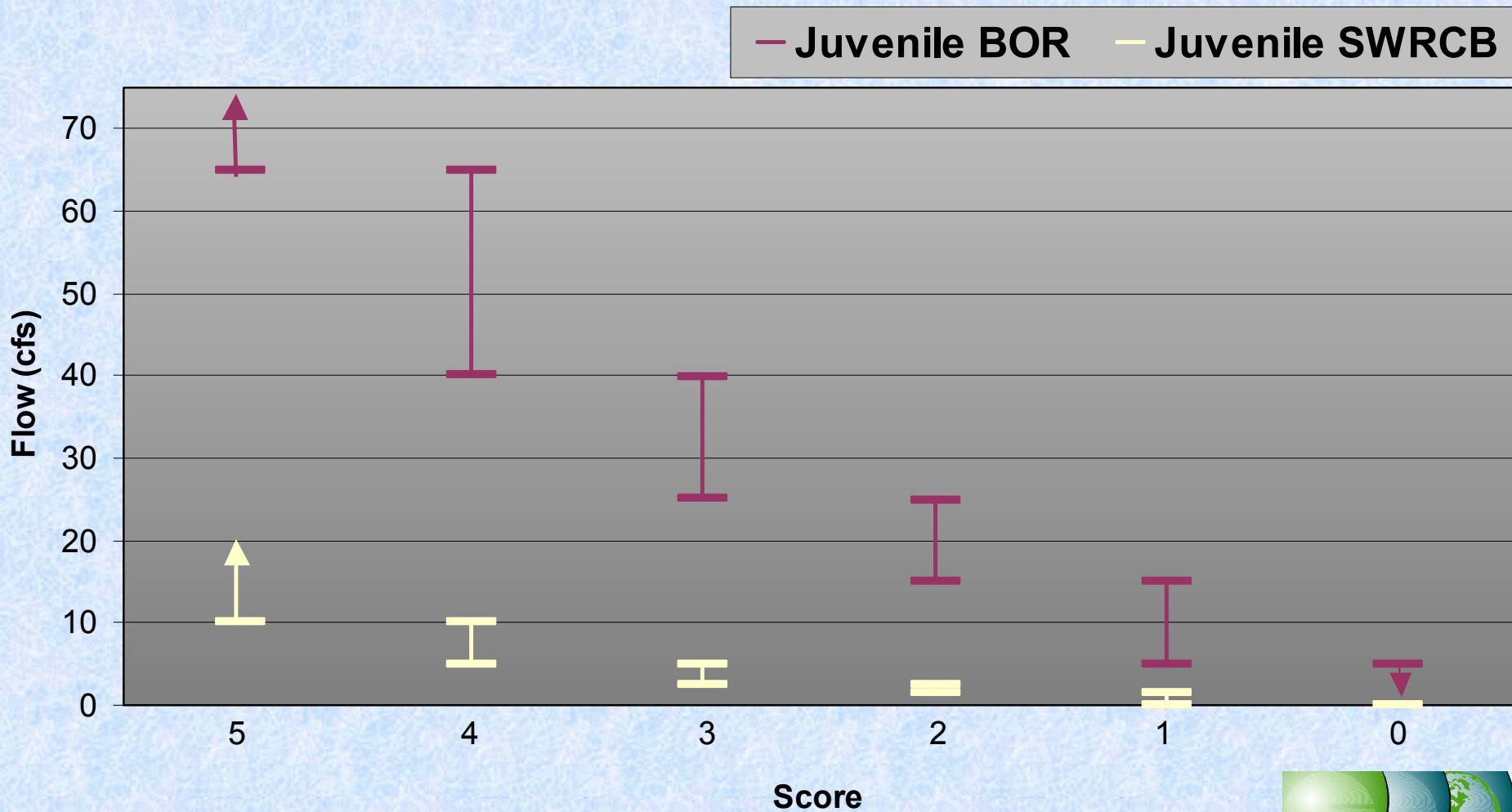
SWRCB v. BOR Scoring Criteria Steelhead Spawning



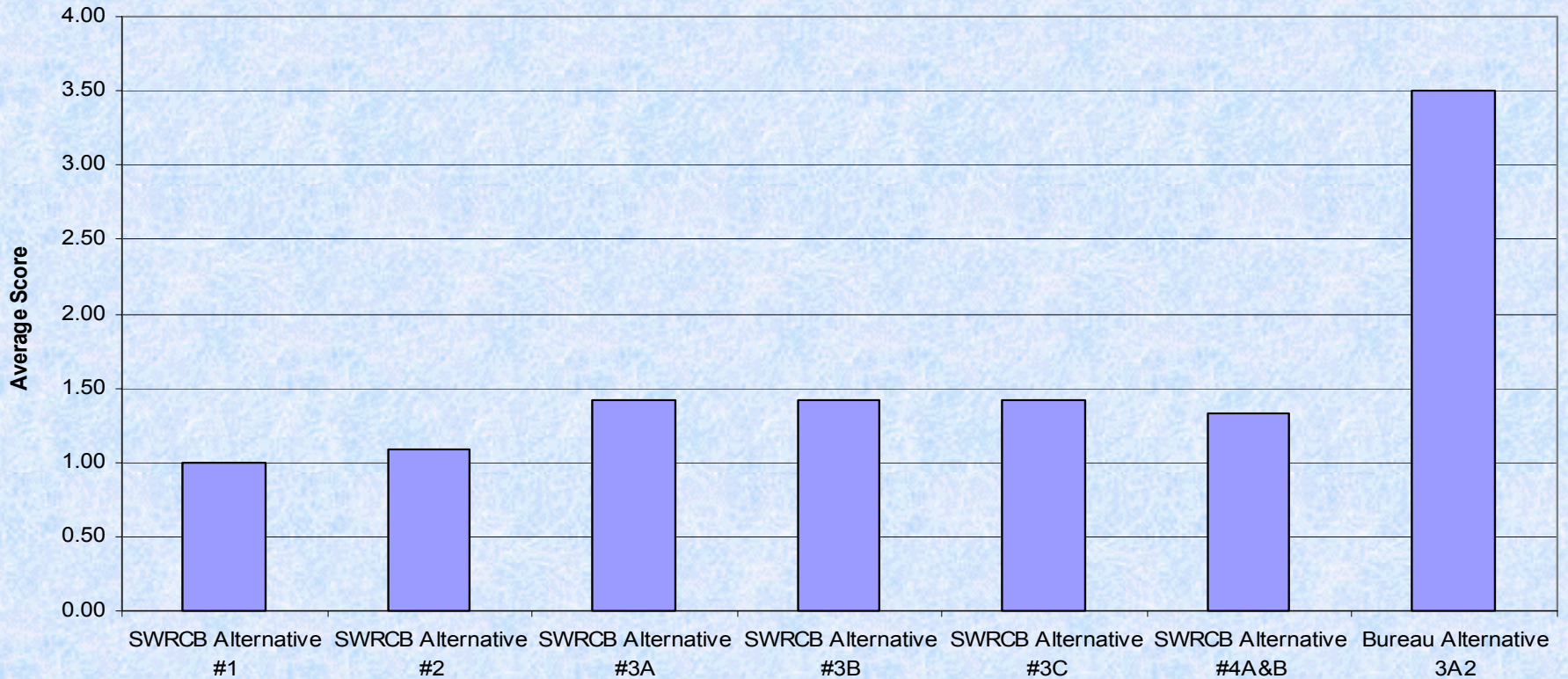
SWRCB v. BOR Scoring Criteria Steelhead Fry Rearing



SWRCB v. BOR Scoring Criteria Juvenile Steelhead Rearing



SWRCB V. BOR Habitat Scoring by Alternatives Using Median Flow Data 1918 - 1992 For All Steelhead Life Stages



Flow Issues and Steelhead Requirements Below Bradbury Dam - *Overall Conclusions RE: Instream Flows*

- **Due to paucity of empirical data, use of Top-Width method is inappropriate for determining habitat/discharge relationships**
- **BO and FMP flows will not restore steelhead populations or maintain steelhead in good condition**
- **Alt. 3A2 in BOR's Cachuma Contract Renewal EIS/EIR is more likely to restore steelhead population conditions**
 - **Better habitat/discharge evaluation techniques**
 - **More accurate habitat score evaluation**
- **With necessary substrate improvements, Alt. 3A2 will maintain the steelhead population in good condition**
- **Focused studies are necessary to verify passage success and to validate modeling results for spawning and rearing flows**
- **Focused studies are recommended to consider modification of downstream water rights release schedule (i.e., 89-18 flows) to improve steelhead rearing conditions.**



Upstream and Downstream Passage Issues Around Bradbury Dam

- **Full utilization of Santa Ynez River Watershed by steelhead prior to Cachuma Project**
- **Current and proposed flow and non-flow improvements below Bradbury Dam cannot mitigate for loss of upstream habitat**
 - **Lower river and upper river are not functionally similar**
- **Urgent need for in-depth studies of various options for steelhead passage above Bradbury Dam due to extremely low population numbers**



Adaptive Management and Establishment of Target Success Criteria

- **The proposed Adaptive Management Plan is an information feedback loop, not a scientific method for evaluating predictive outcomes**
- ***A-priori* target success criteria are a critical component of the adaptive management framework**
- **Measurable success criteria are essential for achieving adaptive management goals**
- **Examples of success criteria are found in new Settlement Agreements for FERC relicensing (i.e., Mokelumne Project, Rock Creek-Cresta Project, EID Project 184, and Battle Creek Project)**
- **Additional studies may be required as necessary, depending on results of adaptive management process**



Summary of Conclusions and Recommendations

- **Alt. 3A2 in BOR's Cachuma Contract Renewal EIS/EIR is more likely to restore steelhead population conditions**
- **With necessary substrate improvements, Alt. 3A2 will maintain the steelhead population in good condition**
- **BO and FMP flows are not likely to restore steelhead populations or maintain steelhead in good condition**
- **Focused studies are necessary to verify passage success and to validate modeling results for spawning and rearing flows**
- **Focused studies are recommended to consider modification of downstream water rights release schedule (i.e., 89-18 flows) to improve steelhead rearing conditions.**
- **Urgent need for in-depth studies of various options for steelhead passage above Bradbury Dam due to extremely low population numbers**
- ***A-priori* target success criteria are a critical component of the adaptive management framework. Measurable success criteria are essential for achieving adaptive management goals**

